DRAFT-FINAL

Site Investigation

Site-Specific Field Sampling Plan, Site-Specific Safety and Health Plan, and Site-Specific Unexploded Ordnance Safety Plan Attachments Former Toxic Gas Area - Pelham Range, Parcel 211(7)

Fort McClellan
Calhoun County, Alabama

August 2002

Task Order CK05
Contract Number DACA21-96-D-0018

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of Engineers
Mobile District

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Draft-Final
Site-Specific Field Sampling Plan
Site-Specific Safety and Health Plan, and Site-Specific Unexploded Ordnance Safety Plan Attachments
Former Toxic Gas Area – Pelham Range, Parcel 211(7)

Fort McClellan
Calhoun County, Alabama

Task Order CK05
Contract No. DACA21-96-D-0018
IT Project No. 774645

August 2002

Draft-Final
Site-Specific Field Sampling Plan Attachment
Former Toxic Gas Area – Pelham Range, Parcel 211(7)

Fort McClellan
Calhoun County, Alabama

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Revision 0

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List of Acronyms

See Attachment 1, List of Abbreviations and Acronyms.

Executive Summary

In accordance with Contract Number DACA21-96-D-0018, Task Order CK05, IT Corporation (IT) will conduct site investigation activities at the Former Toxic Gas Area at Pelham Range, Parcel 211(7), at Fort McClellan, Calhoun County, Alabama, to determine the presence or absence of potential site-specific chemicals at this site. The purpose of this site-specific field sampling plan is to provide technical guidance for sampling activities at the Former Toxic Gas Area, Parcel 211(7).

The Toxic Gas Area, Parcel 211(7), is located in northwest Pelham Range. The oval-shaped area consists of approximately 300 acres of hilly, vegetated terrain that encompasses all of Training Area 10B and extends into parts of Training Areas 9A, 9B, and 10A. According to the U.S. Army Center for Health Promotion and Preventive Medicine, the Toxic Gas Area was delineated on a 1958 maneuver area map of Pelham Range and was used until the early 1960s. Training Area 10B (Parcel 211[7]) is shown as a chemical area on Plate 2 of the U.S. Army Corps of Engineers December 1999 *Archives Search Report, Ordnance and Explosives Chemical Warfare Materials, Pelham Range, Anniston Alabama.* The Environmental Baseline Survey (EBS) states that the area was used for training exercises with chloroacetophenone (CN), ortho-chlorobenzylidene-malononitrile (CS), chlorine gas (CL), and smoke. Currently, the site is posted with signs reading "Danger Toxic Gas Area, Keep Out"; however, unauthorized access to the area is possible.

The EBS extended the boundary of Parcel 211(7) west and southwest of Training Area 10B to include areas of suspected toxic chemical agent storage and disposal in Training Areas 9A and 10A. The EBS reports that storage and disposal sites were located in fenced areas a short distance from the road leading to Gate 10 (west of the Toxic Gas Area) and on the east side of the road leading to Range I. Little is known about the locations of the disposal areas; however, it is believed that toxic chemical agents were stored and/or disposed of due to restrictions on transportation of toxic chemical agent which precluded returning it to Fort McClellan.

IT will collect 17 surface soil samples, 13 subsurface soil samples, 1 drum sample, and 10 groundwater samples at this site. IT will also conduct a surface geophysical survey to delineate a potential storage/disposal area located at the site. Potential contaminant sources at the Former Toxic Gas Area, Parcel 211(7) are primarily metals, chemical agent degradation products, explosives, and chemicals commonly associated with the CWM decontamination activities. Chemical analyses of the samples collected during the field program will include metals, volatile

organic compounds, semivolatile organic compounds, and nitroaromatic/nitramine explosives. In addition, a select number of samples will be analyzed for CWM breakdown products. Results from these analyses will be compared with site-specific screening levels, ecological screening values, and background values to determine if potential site-specific chemicals are present at the site at concentrations that pose an unacceptable risk to human health or the environment. In addition, a drum sample will be collected to determine the contents of the drum. The drum sample will be analyzed for volatile organic compounds, semivolatile organic compounds, and metals.

The presence of unexploded ordnance (UXO) is possible at the Former Toxic Gas Area, Parcel 211(7), because it is located within Pelham Range, which is an active range. Therefore, IT will conduct UXO avoidance activities as outlined in Appendix E of the installation-wide sampling and analysis plan (SAP) and the attached site-specific UXO safety plan prior to initiating field activities at Parcel 211(7). The surface sweeps and downhole surveys will be conducted to identify anomalies for the purpose of UXO avoidance.

This site-specific field sampling plan attachment to the SAP for the Former Toxic Gas Area, Parcel 211(7), will be used in conjunction with the site-specific safety and health plan, the site-specific UXO safety plan, the installation-wide work plan, and the SAP. The SAP includes the installation-wide safety and health plan, monitoring well installation and maintenance plan, investigation-derived waste management plan, ordnance and explosives management plan, and quality assurance plan. Site-specific hazard analyses are included in the site-specific safety and health plan.

1.0 Project Description

1.1 Introduction

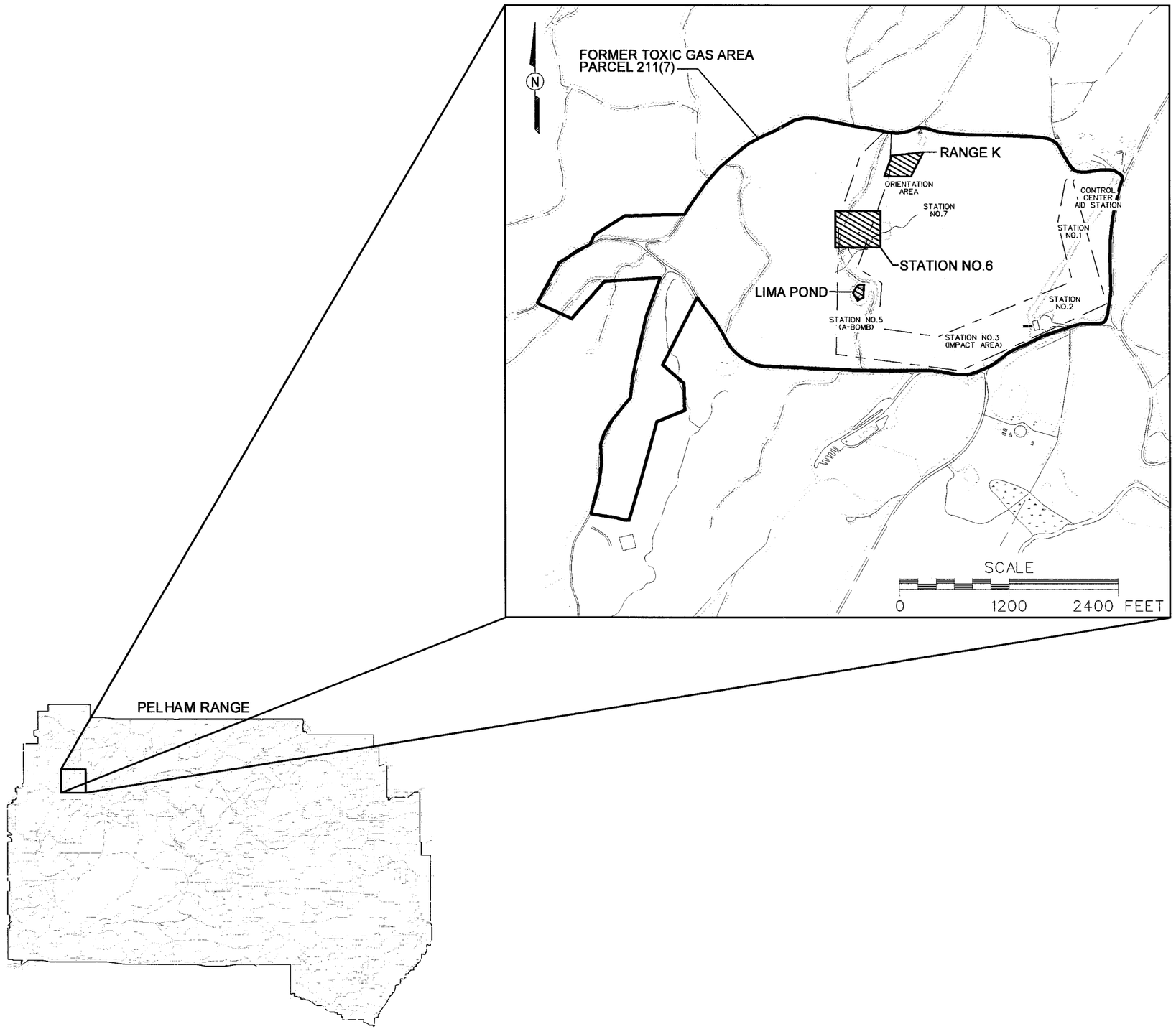
The U.S. Army is conducting studies of the environmental impact of suspected contaminants at Fort McClellan (FTMC) in Calhoun County, Alabama, under the management of the U.S. Army Corps of Engineers (USACE)-Mobile District. The USACE has contracted IT Corporation (IT) to provide environmental services for the site investigation (SI) at the Former Toxic Gas Area at Pelham Range, Parcel 211(7), under Task Order CK05, Contract Number DACA21-96-D-0018.

This site-specific field sampling plan (SFSP) is an attachment to the installation-wide sampling and analysis plan (SAP) for FTMC (IT, 2002a) and has been prepared to provide technical guidance for sample collection and analysis at the Former Toxic Gas Area, Parcel 211(7). This SFSP will be used in conjunction with the site-specific safety and health plan (SSHP) and site-specific unexploded ordnance (UXO) safety plan developed for the Former Toxic Gas Area, Parcel 211(7), and the installation-wide work plan (IT, 2002b) and SAP. The SAP includes the installation-wide safety and health plan, monitoring well installation and maintenance plan, investigation-derived waste (IDW) management plan, ordnance and explosives management plan, and quality assurance plan (QAP). Site-specific hazard analyses are included in the SSHP.

1.2 Site Description

The Toxic Gas Area, Parcel 211(7), is located in northwest Pelham Range (Figure 1-1). The oval-shaped area consists of approximately 300 acres of hilly, vegetated terrain that encompasses all of Training Area 10B and extends into parts of Training Areas 9A, 9B, and 10A (Figure 1-2). Delineated on a 1958 maneuver area map of Pelham Range, the Toxic Gas Area was used until the early 1960s (U.S. Army Center for Health Promotion and Preventive Medicine [CHPPM], 1999). Training Area 10B (Parcel 211[7]) is shown as a chemical area on Plate 2 of the USACE December 1999 *Archives Search Report, Ordnance and Explosives Chemical Warfare Materials, Pelham Range, Anniston Alabama.* The area was used for training exercises with chloroacetophenone (CN), ortho-chlorobenzylidene-malononitrile (CS), chlorine gas (CL), and smoke (Environmental Science and Engineering, Inc. [ESE], 1998). Currently, the site is posted with signs reading "Danger Toxic Gas Area, Keep Out"; however, unauthorized access to the area is possible.

The Environmental Baseline Survey (EBS) extended the boundaries of Parcel 211(7) to the west and southwest of Training Area 10B to include areas of suspected toxic chemical agent storage



LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TREES / TREELINE
- MARSH / WETLANDS
- PARCEL BOUNDARY
- SEPARATE INVESTIGATION
- SURFACE DRAINAGE / CREEK
- OBSTACLE COURSE

FIGURE 1-1
SITE LOCATION MAP
FORMER TOXIC GAS AREA
PARCEL 211(7)

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

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FORMER TOXIC GAS AREA
PARCEL 211(7)
(297 ACRES)

RANGE K

ORIENTATION AREA

STATION NO.7

STATION NO.6

CONTROL CENTER AID STATION

STATION NO.1

LIMA POND

STATION NO.2

STATION NO.5 (A-BOMB)

STATION NO.3 (IMPACT AREA)

FORMER DECONTAMINATION TRAINING AREA
PARCEL 207(7)

BURIAL MOUND AT RIDEOUT FIELD

LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
- TREES / TREELINE
- MARSH / WETLANDS
- PARCEL BOUNDARY
- SEPARATE INVESTIGATION
- SURFACE DRAINAGE / CREEK
- FENCE
- OBSTACLE COURSE

SCALE
0 600 1200 FEET

SOURCE: U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTATIVE MEDICINE, "PRELIMINARY ASSESSMENT NO. 38-EH-1775-99, FORT McCLELLAN ARMY NATIONAL GUARD TRAINING CENTER, FORT McCLELLAN, ALABAMA MAY 28 - JUNE 17, 1999."

FIGURE 1-2
SITE MAP
FORMER TOXIC GAS AREA
PARCEL 211(7)

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

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and disposal in Training Areas 9A and 10A (ESE, 1998) (Figure 1-2). Storage and disposal sites were reportedly located in fenced areas a short distance from the road leading to Gate 10 (west of the Toxic Gas Area) and on the east side of the road leading to Range I. Little is known about the locations of the disposal areas; however, it is believed that toxic chemical agents were stored and/or disposed of due to restrictions on transportation of toxic chemical agent which precluded returning it to FTMC (ESE, 1998).

Range K, Parcel 207(7), Range L (Lima Pond), Parcel 204(7), and a chemical obstacle course that included Station No. 6 are all located within the Toxic Gas Area (ESE, 1998) (Figure 1-2). The EBS also reported a personnel decontamination area and an identification/decontamination training station in the southern portion of the Toxic Gas Area (ESE, 1998). Range K, Range L (Lima Pond), and Station No. 6 of the chemical obstacle course are currently being investigated, as discussed in Chapter 2.0 of this SFSP.

The *Archives Search Report* for Pelham Range states that in the 1950s the Chemical Corps School at Fort McClellan constructed a chemical, biological, and radiological (CBR) tactical training exercise course at Pelham Range in the Toxic Gas Area (Figure 1-2). CBR officers and enlisted soldiers received realistic training at a designated, seven-station field course (USACE, 1999). The field course consisted of:

- Station No. 1 included simulated machine-gun fire, blocks of nitrostarch, blasting caps, shell simulators, and CN-adamsite (DM) grenades.
- Station No. 2 included CN-DM grenades and simulator shell bursts.
- Station No. 3 included electric blasting caps, dud chemical shells, shell simulators, simulated machine-gun fire, and tubes of chloropicrin (PS) and phosgene (CG).
- Station No. 4 included blasting caps, M117 booby-trap simulators, shell simulators, and PS (not shown on figures).
- Station No. 5 included radioactive sources. These were placed in a man-made crater (Lima Pond) to simulate the residue from an atomic bomb. [Note: Station No. 5 is currently being investigated in the SI at Range L, Lima Pond, Parcel 207(7)].
- Station No. 6 included electric blasting caps, detonating cord, molasses residuum mustard (MR), distilled mustard (HD), and simulated armor-piercing mines. [Note: Station No. 6 is currently being investigated in the SI at Station No. 6, Substation of Former Toxic Gas Area, Parcel 211(7)].

- Station No. 7 included white phosphorous, M-15 smoke grenades, HC smoke grenades, blocks of nitrostarch, M2 flame throwers, electric blasting caps, M5 smoke pots, shell simulators, and petarey thritol tetranitrate (PETN) detonating cord.

The obstacle course concluded with a personnel decontamination station consisting of a decontamination truck for washing hands and faces (CHPPM, 1999). The chemical obstacle course was used from approximately 1955 to 1963 (CHPPM, 1999).

A personnel decontamination station was established at the south side of the Toxic Gas Area (north of the burial mound at Rideout Field) and was used in conjunction with the Former Decontamination Training Area (Parcel 207[7]) (ESE, 1998). A detection and identification/decontamination training station was also located within the southern portion of the Toxic Gas Area (ESE, 1998). At this station, training exercises consisted of contaminating two World War II-era tanks with mustard and allowing trainees to perform detection tests. A second group of trainees would decontaminate the tanks using noncorrosive decontamination agent (DANC) (ESE, 1998). The EBS states that mustard was the only chemical warfare agent used at this station.

A survey conducted by the U.S. Army Chemical School in 1967 declared the chemical obstacle course area free of contamination (CHPPM, 1999). All empty rounds, containers, and miscellaneous items were policed and disposed of in accordance with standard operating procedures (not specified). The area was bulldozed and decontaminated. Based on existing information, the report concluded there appeared to be no significant risk for surface activity; however, the exact location of the chemical obstacle course was unknown (CHPPM, 1999).

IT conducted site walks of Parcel 211(7) at Training Areas 9A, 9B, 10A, and 10B in July/August 2001 and January 2002 (Figure 1-3). In Training Areas 9A and 9B, both sides of the road leading to Gate 10 were walked; however, no storage and/or disposal sites were located. Training Area 10B was walked from Range I to the intersection of the road south of Training Area 10B. North of Range I, three metal fence posts were observed in an east-west trending direction. A ground scar devoid of vegetation approximately 25 feet by 25 feet was noted between two of the posts (physical feature 34, Figure 1-3).

Training Area 10B was walked for evidence of chemical warfare material (CWM) (Figure 1-3). Along the eastern side of the site, three 55-gallon drums were found in various conditions, one

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TO GATE 10

RANGE K - PARCEL 203(7)

RANGE L - PARCEL 204(7)

RANGE I - PARCEL 201(7)

TRAINING AREA 10B

ORIENTATION AREA

STATION NO.7

STATION NO.6 (MINES)

STATION NO.5 (A-BOMB)

STATION NO.3 (IMPACT AREA)

STATION NO.2

STATION NO.1

CONTROL CENTER AID STATION

RIDEOUT HALL BUILDING 880

RJ30

RJ29

RJ28

FORMER TOXIC GAS AREA PARCEL 211(7)

FORMER DECONTAMINATION TRAINING AREA PARCEL 207(7)

BURIAL MOUND AT RIDEOUT FIELD

PR-211-GP02 PR-211-GP01

SOURCE: U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTATIVE MEDICINE, "PRELIMINARY ASSESSMENT NO. 38-EH-1775-99, FORT McCLELLAN ARMY NATIONAL GUARD TRAINING CENTER, FORT McCLELLAN, ALABAMA MAY 28 - JUNE 17, 1999."

SCALE
0 300 600 FEET

LEGEND:

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
- PARCEL BOUNDARY
- SEPARATE INVESTIGATION
- TREES / TREELINE
- MARSH / WETLANDS
- SURFACE DRAINAGE / CREEK
- FENCE
- CHEMICAL OBSTACLE COURSE
- RJ ROAD JUNCTION
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION

PHYSICAL FEATURES OBSERVED

1. U-SHAPED DIRT MOUND
2. 10' x 10' x 3' MOUND
3. 8' x 5' x 2' MOUND WITH EXPENDED SMALL ARMS BLANK CASINGS
4. 6' x 2' x 1' DEPRESSIONS (SEVERAL IN AREA), AND 5' x 3' x 2' CRESCENT SHAPED MOUNDS
5. 10' x 4' x 5' DEPRESSION (METAL IN BOTTOM)
6. THREE 10' x 10' x 2' DEPRESSIONS
7. CONVERGENCE OF TWO UNIMPROVED OVERGROWN ROADS
8. 5' x 5' x 1' CIRCULAR AND RECTANGULAR DEPRESSIONS
9. FOUR DROP (SPRAY) TANKS 5' x 3' (DIAMETER) LABELED: SMOKE, CHEMICAL WARFARE SERVICE USA, NO. M33A1 TANK, AIRPLANE, EDGEWOOD ARSENAL MARYLAND. TWO ARE TORN APART, TWO ARE STILL INTACT, ALL ARE RUSTED AND EMPTY
10. 15' x 10' x 4' U-SHAPED MOUND WITH TWO 10'x4'x3' RECTANGULAR DEPRESSIONS TO THE NORTH
11. 15' x 5' x 4' DEPRESSION, WITH ONE METAL POST TO THE SOUTH
12. TWO WWII ERA TANKS
13. 20' x 10' x 2' DEPRESSION
14. 15' x 15' x 6' DEPRESSION
15. WOODEN PALLET
16. EMPTY STB BARREL LABELED: 3lbs BLEACH/1 GALLON WATER. BARREL APPROXIMATELY 1.5' x 3' (DIAMETER), OPEN AND RUSTED
17. RUSTED SMOKE POT AND MACHINE GUN AMMO BELT / SEVERAL SLAP FLARES
18. FOG OIL DRUM LID / NEAR BY TRENCH AND MOUNDS
19. 5' x 2' x 1' FIGHTING POSITIONS WITH SMOKE GRENADE CANISTER AND EXPENDED SMALL ARMS BLANK CASINGS AROUND FIGHTING POSITIONS
20. 5' x 10' x 5' MANHOLE WITH EXPENDED SMOKE GRENADE
21. 70' x 30' x 5' MANMADE DEPRESSION
22. EXPENDED 81mm ILLUMINATION MORTAR (OLD AND RUSTED)
23. OLD RUSTED MUNITIONS CANISTER
24. 55-GALLON DRUM APPROXIMATELY HALF FULL OF LIQUID AND LYING ON SIDE, RUSTED, NOT LABELED
25. U-SHAPED FIGHTING POSITION (IN SIDE OF HILL)
26. EMPTY 55-GALLON DRUM LABELED: FOG OIL SGFT2 (ON LID), CLOSED, RUSTED, SLIGHTLY GREEN COLORED.
27. 5' x 2' x 1' FIGHTING POSITIONS WITH EXPENDED SMALL ARMS BLANK CASINGS
28. OLD WOODEN FENCE POST
29. DRUM LID CLAMP (NO DRUM)
30. EMPTY 55-GALLON DRUM, APPEARS TO HAVE BEEN USED AS A FIRE PIT
31. 7' x 4' x 3' FIGHTING POSITIONS WITH SMALL ARMS BLANK CASINGS
32. CONCRETE PADS WITH METAL TIE DOWNS. BASE OF FORMER OBSERVATION TOWER
33. FOUR FIGHTING POSITIONS, LARGEST IN U-SHAPE WITH EXTENDED BACK SIDE, APPROXIMATELY 10' x 10' x 4', OTHERS ARE CIRCULAR APPROXIMATELY 5' x 5' x 2', SMALL ARMS BLANK CASINGS AND EXPENDED SLAP FLARES ALSO FOUND IN AREA
34. 25' x 25' GROUND SCAR BETWEEN FENCE POSTS. THREE METAL FENCE POSTS, APPROXIMATELY 3' HIGH, WITH YELLOW PAINTING ON TOP 6"
35. SERIES OF SMALL DEPRESSIONS 1' x 4' x ½' (APPEAR TO BE FOXHOLES)
36. 55-GALLON DRUM WITH NEGLIGIBLE AMOUNT OF MOISTURE (SITTING UPRIGHT)
37. L-SHAPE TRENCH APPROXIMATELY 4' TO 6' (WIDE) x 3' (DEEP)
38. POSSIBLE GROUND SCAR
39. GROUND SCAR
40. TWO SHERMAN TANKS (POSSIBLY USED FOR DECONTAMINATION PROCEDURES)
41. EMPTY RUSTED METAL CANISTERS (THREE RECTANGULAR, TWO CYLINDRICAL)
42. ONE EMPTY RUSTED METAL CANISTER (CYLINDRICAL)
43. 12' x 5' x 5' DEPRESSION WITH RUSTED METAL AND OLD CROSS TIES, POSSIBLY OLD BUNKER
44. FOUR CIRCULAR DEPRESSIONS APPROXIMATELY 8' x 4' x 4'
45. ONE BUILDING (BUNKER) MADE OF CINDER BLOCKS, TWO CINDER BLOCK FOUNDATIONS WITH 150' LONG TRENCH IN BETWEEN (IN HILLSIDE)
46. THREE DEPRESSIONS 3' x 4' x 2'

NOTE:

1. PHYSICAL FEATURES OBSERVED DURING SITE WALK CONDUCTED BY IT AUGUST 2001 AND JANUARY 2002.

FIGURE

FIGURE 1-3
SITE FEATURES MAP
FORMER TOXIC GAS AREA
PARCEL 211(7)

ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
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labeled as a fog oil storage drum (empty), one sitting upright with a negligible amount of moisture, and the third turned on its side and approximately half full of liquid (physical features 26, 24, and 36, Figure 1-3). East of Station No. 6, four 5-foot by 3-foot spray tanks, labeled "Chemical Warfare Service USA, No. M33A1," were observed (physical feature 9, Figure 1-3). Two of the spray tanks were torn apart, two were intact. Two World War II-era tanks were noted in the south-central portion of Training Area 10B, east of the unimproved road to Lima Pond (physical feature 12, Figure 1-3). Two more World War II era tanks were noted on a hillside, east of the previously mentioned tanks (physical feature 40, Figure 1-3). Both sets were intact, one with a sign reading "Contaminated, Keep Off." One empty supertropical bleach (STB) drum was observed in the southeastern portion of the site near a decontamination station described in the EBS (physical feature 16, Figure 1-3). Two bunkers separated by a large trench were observed on a hillside near the location of former Station No. 7 (physical feature 45, Figure 1-3). A fragment of an M2 flame-thrower was also noted at this location and several circular depressions were observed west of the bunkers (physical feature 44, Figure 1-3). Several metal canisters were found to the west of Station No. 6, in and around depressions that appear to be former bunkers or foxholes (physical features 41, 42, 43; Figure 1-3). Small arms blank casings, foxholes, depressions, and discarded training materials were found throughout the Toxic Gas Area.

Chemical agents and decontamination agents reportedly used at the Former Toxic Gas Area included:

- Chloroacetophenone (CN)
- Ortho-chlorobenzylidene-malononitrile (CS)
- Chlorine gas (CL)
- Chloropicrin (PS)
- Decontamination agent (noncorrosive) (DANC)
- Decontamination Solution Number 2 (DS2)
- Adamsite (DM)
- Phosgene (CG)
- Distilled mustard (HD)
- Supertropical bleach (STB) (CHPPM, 1999).

CN. CN (chloroacetophenone) is a white crystalline solid used as a tear agent. CN is used in conjunction with mortar shells, grenades, and candles (U.S. Departments of the Army and the Air Force, 1963).

CS. CS (ortho-chlorobenzylidene-malononitrile) is a white crystalline powder used as a tear agent. A mixture of 95 percent crystalline agent and 5 percent crystalline gel is used as filling for bursting-type grenades and in all bulk irritant agent dispersant (U.S. Departments of the Army and the Air Force, 1963).

CL. CL was used as a tear agent, released from cylinders in gas chambers for training (U.S. Departments of the Army and the Air Force, 1963).

PS. PS acts as a vomiting agent, a choking agent, and a tear agent. Most often a percentage of PS is used with CN and chloroform to make CNS. CNS is distributed in bombs, spray tanks, mortar shells, and grenades (U.S. Departments of the Army and the Air Force, 1963).

DANC. DANC is a 6.25-percent solution of RH-195 (1,3-dichloro-5,5-dimethylhydantoin) in 1,1,2,2-tetrachloroethane (acetylene tetrachloride) and was adopted as a satisfactory HD decontamination agent in small-scale operations (U.S. Departments of the Army and the Air Force, 1963).

DS2. DS2 is a clear solution of general-purpose decontaminant consisting of 70 percent diethylenetriamine, 28 percent solvent (ethylene glycol monomethylether), and 2 percent active agent booster (sodium hydroxide). DS2 reacts with sarin and mustard to effectively reduce their hazard within 5 minutes of application. It is effective for most toxic chemical agents. DS2 was applied manually or by using a portable decontaminating apparatus such as the M11 (U.S. Departments of the Army and Air Force, 1963).

DM. DM is a vomiting agent (diphenylaminochloroarsine) used for training and riot control. DM is used in candles and grenades (U.S. Departments of the Army and the Air Force, 1963).

CG. CG is a choking agent made of carbonyl chloride. CG exerts its effect solely on the lungs and results in watery fluid into the air sacs. It is used in mortar shells, bombs, rockets, and cylinders (U.S. Departments of the Army and the Air Force, 1963).

HD. HD is mustard (2,2-dichlorodiethylsulfide) that has been purified by washing and vacuum distillation. HD was used as a blister agent designed to affect the eyes and lungs and blister the skin (U.S. Departments of the Army and the Air Force, 1963).

STB. STB is a decontamination agent referred to as bleach, bleaching powder, supertropical bleach, bleaching material, or chlorinated lime. STB is a white powder containing about 30 percent available chlorine (U.S. Departments of the Army and the Air Force, 1963).

Soils. The soil associations found at the Former Toxic Gas Area, Parcel 211(7), (U.S. Department of Agriculture [USDA], 1961) include:

- ***Montevallo Series***. Shallow, well drained, moderately permeable soils that formed in residuum from siltstone or silty shale. These soils are on gently sloping to steep, narrow ridgetops and sideslopes. Slopes range from 2 to 60 percent.

- ***Rarden Gravelly Loam.*** Moderately deep, moderately well drained soils formed in residuum from acid clay shale with interbedded siltstone in some areas. These soils are on hills. Permeability is slow. Slopes range from 2 to 50 percent.

- ***Anniston Gravelly Clay Loam.*** Deep, well drained, moderately permeable soils that formed in clayey alluvium and colluvium from sandstone, shale, and quartzite. These soils are on gently sloping to steep uplands.

- ***Tyler Silt Loam.*** Very deep, somewhat poorly drained soils formed in silty alluvium and in a mantle of loess on high Illinoian-age terraces and valley fills. Permeability is moderately slow. Slope ranges from 0 to 8 percent.

- ***Stony Rough Land, Sandstone.*** Rough, mountainous areas with many outcrops of sandstone and quartzite bedrock, loose rock fragments, and scattered patches of sandy soil material. Slope is generally more than 25 percent.

1.3 Scope of Work

The scope of work for activities associated with the SI at the Former Toxic Gas Area, Parcel 211(7), as specified by the statement of work (USACE, 2000), includes the following tasks:

- Develop the SFSP attachment.

- Develop the SSHP attachment.

- Develop the UXO safety plan attachment.

- Conduct a surface and near-surface UXO survey over all areas to be included in the sampling effort.

- Provide downhole UXO support for all intrusive drilling to determine buried downhole hazards.

- Collect 17 surface soil samples, 13 subsurface soil samples, 1 drum sample, and 10 groundwater samples to determine whether potential site-specific chemicals (PSSC) are present and to provide data useful for supporting any future planned corrective measures and closure activities.

- Conduct a geophysical survey using magnetics, time and frequency-domain electromagnetic (EM) induction, and ground-penetrating radar (GPR) techniques to map a possible waste disposal site and screen the site for buried glass and/or metal.

- Analyze samples for the parameters listed in Section 4.6.

Pelham Range is an active range maintained by the Alabama National Guard. Therefore, UXO surface sweeps and downhole surveys of soil borings will be required to support field activities at this site. The surface sweeps and downhole surveys will be conducted to identify anomalies for the purposes of UXO avoidance. The site-specific UXO safety plan attachment addresses the manner in which the avoidance will be conducted.

At completion of the field activities and sample analyses, an SI summary report will be prepared to evaluate the absence or presence of PSSCs at this site and to recommend further actions, if appropriate. The SI summary report will be prepared in accordance with current guidelines of the EPA, Region 4, and the Alabama Department of Environmental Management (ADEM).

2.0 Summary of Existing Environmental Studies

An EBS was conducted by ESE to document current environmental conditions of all FTMC property (ESE, 1998). The study was to identify sites that, based on available information, have no history of contamination and comply with U.S. Department of Defense guidance for fast-track cleanup at closing installations. The EBS also provides a baseline picture of FTMC properties by identifying and categorizing the properties by the following seven criteria:

1. Areas where no storage, release, or disposal of hazardous substances or petroleum products has occurred (including no migration of these substances from adjacent areas)

2. Areas where only release or disposal of petroleum products has occurred

3. Areas where release, disposal, and/or migration of hazardous substances has occurred, but at concentrations that do not require a removal or remedial response

4. Areas where release, disposal, and/or migration of hazardous substances has occurred, and all removal or remedial actions to protect human health and the environment have been taken

5. Areas where release, disposal, and/or migration of hazardous substances has occurred, and removal or remedial actions are underway, but all required remedial actions have not yet been taken

6. Areas where release, disposal, and/or migration of hazardous substances has occurred, but required actions have not yet been implemented

7. Areas that are not evaluated or require further evaluation.

The EBS was conducted in accordance with the CERFA protocols (CERFA-Public Law 102-426) and U.S. Department of Defense policy regarding contamination assessment. Record searches and reviews were performed on all reasonably available documents from FTMC, ADEM, EPA Region 4, and Calhoun County, as well as a database search of CERCLA-regulated substances, petroleum products, and Resource Conservation and Recovery Act-regulated facilities. Available historical maps and aerial photographs were reviewed to document historical land uses. Personal and telephone interviews of past and present FTMC employees and military personnel were conducted. In addition, visual site inspections were conducted to verify conditions of specific property parcels.

The Former Toxic Gas Area, Parcel 211(7), was identified as a Category 7 CERFA site. A CERFA Category 7 site is a parcel where potential site-specific chemicals were stored, possibly released onto the site or the environment, and/or were disposed of on site property. The Former Toxic Gas Area, Parcel 211(7) lacks adequate documentation and, therefore, requires additional evaluation to determine the environmental condition of the parcel.

Station No. 6, Subsection of Former Toxic Gas Area, Parcel 211(7). Station No. 6 is one of the seven training stations in the Chemical Obstacle Course situated within the Toxic Gas Area, Parcel 211(7). IT is performing a separate site investigation of Station No. 6 (IT, 2001). During the SI, IT has installed 5 permanent groundwater monitoring wells and collected 7 surface soil samples, 7 subsurface soil samples, 2 depositional soil samples, and 5 groundwater samples (Figure 2-1). Samples were analyzed for volatile organic compounds (VOC), semivolatile organic compounds (SVOC), target analyte metals, CWM breakdown products, and nitroaromatic/nitramine explosives. Results from the SI at Station No. 6, Parcel 211(7) will be included with the results of the enclosed proposed investigation at the Former Toxic Gas Area, Parcel 211(7). The proposed samples introduced in this SFSP will be a continuation of the samples previously collected at Station No. 6, Subsection of Former Toxic Gas Area, Parcel 211(7).

Range L, Lima Pond, Parcel 204(7). Previous investigations conducted at Range L include a field survey performed by the Army, a limited SI and RI conducted by SAIC and a supplemental RI and CWM investigation performed concurrently by IT and Parsons Engineering Science, Inc (Parsons) (IT, 2002d; Parsons, 2001). The Army conducted a field survey of Range L and collected surface soil and surface water samples. In 1993 and 1994, SAIC conducted SI and RI activities consisting of the installation of 7 monitoring wells, collection and analysis of 11 surface soil samples, 11 subsurface soil samples, 4 surface water samples, 4 sediment samples, and 7 groundwater samples, and geophysical surveying. Results concluded that low concentrations of SVOCs, VOCs, pesticides, explosive compounds, polychlorinated biphenyls (PCB), and metals were detected in various media. In 2002, IT and Parsons performed a concurrent investigations (supplemental RI/ CWM investigation) consisting of the sampling and analysis of 6 surface water samples and 6 sediment samples (Figure 2-1). Parsons screened and analyzed the samples for CWM and IT analyzed the samples for VOCs, SVOCs, target analyte metals, nitroaromatic/nitramine explosives, and CWM breakdown products. As a result of the Results of the supplemental RI investigations will be reported with the results of the enclosed proposed investigation at the Former Toxic Gas Area, Parcel 211(7).

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RJ30
RJ29
RJ28

RANGE K - PARCEL 203(7)
RNG-203-MW03
RNG-203-MW02
RNG-203-MW05
RNG-203-MW04
RNG-203-GP02
RNG-203-MW14
RNG-203-MW15
RNG-203-GP01
RNG-203-MW01
ORIENTATION AREA
RNG-203-MW06
RNG-203-MW07
RNG-203-MW11
RNG-203-MW09
RNG-203-MW10
RNG-203-MW08
RNG-203-MW13
RNG-203-MW12

STATION NO.7

STATION NO. 6 (MINES)
PR-211-MW01
PR-211-MW03
PR-211-MW02
PR-211-DEP01
PR-211-MW05
PR-211-GP01
PR-211-DEP02
PR-211-GP02
PR-211-MW04

RANGE L - PARCEL 204(7)
RLR-204-SW/SD03
RLR-204-SW/SD01
RLR-204-SW/SD02
RLR-204-SW/SD04
RLR-204-SW/SD05
RLR-204-SW/SD06

STATION NO.5 (A-BOMB)

STATION NO.3 (IMPACT AREA)

STATION NO.2

STATION NO.1

CONTROL CENTER AID STATION

RIDEOUT HALL BUILDING 8801

FORMER DECONTAMINATION TRAINING AREA PARCEL 207(7)

675 650 625 600 575 550 575 600 625 650 575 575

LEGEND:

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
- TOXIC GAS AREA PARCEL 211(7) BOUNDARY
- SEPARATE INVESTIGATION
- SURFACE DRAINAGE / CREEK
- TREES / TREELINE
- FENCE
- CHEMICAL OBSTACLE COURSE
- RJ ROAD JUNCTION
- BEDROCK MONITORING WELL LOCATION
- RESIDUUM MONITORING WELL LOCATION
- SURFACE WATER/SEDIMENT SAMPLE LOCATION
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- GROUNDWATER, SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- DEPOSITIONAL SOIL SAMPLE LOCATION

SOURCE: U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTATIVE MEDICINE, "PRELIMINARY ASSESSMENT NO. 38-EH-1775-99, FORT McCLELLAN ARMY NATIONAL GUARD TRAINING CENTER, FORT McCLELLAN, ALABAMA MAY 28 - JUNE 17, 1999."

SCALE
0 200 400 FEET

FIGURE 2-1
PREVIOUS INVESTIGATIONS
FORMER TOXIC GAS AREA
PARCEL 211(7)

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

IT CORPORATION
A Member of The IT Group

Range K, Former Agent Training Area, Parcel 203(7). Previous investigations conducted at Range K, Former Agent Training Area, Parcel 203(7), consisted of a SI and a remedial investigation (RI) performed by Science Applications International Corporation (SAIC) from 1991 through 1995, a Relative Risk Site Evaluation (RRSE) performed by IT in 2000, and an ongoing supplemental RI performed by IT (IT, 2002c). During the previous investigations, surface soil and subsurface soil samples were collected and 15 groundwater monitoring wells were installed and sampled (one monitoring well, RNG-203-MW02, was observed dry) (Figure 2-1). Four of the monitoring wells were installed by IT during the RRSE in 2000 and 11 were installed by IT during the RI in 2001 (IT, 2002c). Results from the ongoing supplemental RI at Range K will be reported under a separate cover.

3.0 Site-Specific Data Quality Objectives

3.1 Overview

The data quality objective (DQO) process is followed to establish data requirements. This process ensures that the proper quantity and quality of data are generated to support the decision-making process associated with the action selection for the Former Toxic Gas Area, Parcel 211(7). This section incorporates the components of the DQO process described in the publication EPA 600/R-96/005, *Guidance for the Data Quality Objectives Process* (EPA, 2000). The DQO process as applied to the Former Toxic Gas Area, Parcel 211(7), is described in more detail in Section 3.4 of this SFSP. Table 3-1 provides a summary of the factors used to determine the appropriate quantity of samples and the procedures necessary to meet the objectives of the SI and establish a basis for future action at this site.

The samples will be analyzed using EPA SW-846 methods, including chemistry data reporting requirements and data package deliverables, Update III Methods where applicable, as presented in Chapter 4.0 in this SFSP and Chapter 5.0 in the QAP. Data will be reported in accordance with definitive data requirements of Chapter 2, *Chemistry Data Reporting Requirements and Data Package Deliverables*, USACE Engineer Manual 200-1-6, *Chemical Quality Assurance for Hazardous, Toxic and Radioactive Waste (HTRW) Projects* (USACE, 1997) and evaluated by the stipulated requirements for the generation of definitive data (Section 7.2.2 of the QAP). Chemical data will be reported by the laboratory via hard-copy data packages using Contract Laboratory Program-like forms, along with electronic copies. These packages will be validated in accordance with EPA National Functional Guidelines by Level III criteria.

3.2 Data Users and Available Data

The available data related to the SI at the Former Toxic Gas Area, Parcel 211(7), presented in Table 3-1, have been used to formulate a site-specific conceptual model. This conceptual model was developed to support the development of this SFSP, which is necessary to meet the objectives of these activities and to establish a basis for future action at the site. The data users for the data and information generated during field activities are primarily EPA, USACE, ADEM, FTMC, and other USACE supporting contractors. This SFSP, along with the necessary companion documents, has been designed to provide the regulatory agencies with sufficient detail to reach a determination as to the adequacy of the scope of work. The program has also been designed to provide the level of defensible data and information required to confirm or rule out the existence of residual chemical contamination in site media.

Table 3-1

Summary of Data Quality Objectives
Former Toxic Gas Area - Pelham Range, Parcel 211(7)
Site Investigation
Fort McClellan, Calhoun County, Alabama

Users	Available Data	Conceptual Site Model	Media of Concern	Data Uses and Objectives	Data Types	Analytical Level	Data Quantity
EPA, ADEM USACE, DOD FTMC, IT Corporation Other contractors, and possible future land users	None	Contaminant Source Parcel 211(7) Migration Pathways Spills, leaching and burial to surface soil and subsurface soil, rain runoff and erosion to surface soil, infiltration and leaching to subsurface soil and groundwater, biotransfer to deer, and dust emissions and volatilization to ambient air. Potential Recptors Recreational site user (current and future), Resident (future), and National Guardsperson (future). PSSC Metals, explosives, CWM breakdown products, VOCs, and SVOCs.	Surface soil Subsurface Soil Groundwater Drum Contents	SI to confirm the presence or absence of contamination in the site media Definitive quality data for future decision making	Surface soil TCL VOCs, TCL SVOCs, TAL metals and explovises; plus a select number for CWM breakdown products.	Definitive data in data packages (as defined in USACE EM200-1-6)	17 surface soil samples + QC
					Subsurface Soil TCL VOCs, TCL SVOCs, TAL metals and explovises; plus a select number for CWM breakdown products.	Definitive data in data packages (as defined in USACE EM200-1-6)	13 subsurface soil samples + QC
					Ground Water TCL VOCs, TCL SVOCs, TAL metals and explovises; plus a select number for CWM breakdown products.	Definitive data in data packages (as defined in USACE EM200-1-6)	10 groundwater samples + QC
					Drum Sample TCL VOCs, TCL SVOCs, and TAL metals.	Definitive data in data packages (as defined in USACE EM200-1-6)	1 drum sample + QC

ADEM - Alabama Department of Environmental Management.
CWM- Chemical warfare material.
DOD - U.S. Department of Defense.
EPA - U.S. Environmental Protection Agency.
Explosives- Nitroaromatic/nitramine explosives.
FTMC - Fort McClellan.
QC - Quality control.
SI - Site investigation.
SVOC - Semivolatile organic compound.
TCL - Target compound list.
TAL - Target analyte list.
USACE - U.S. Army Corps of Engineers.
VOC - Volatile organic compound.
EM 200-1-6 USACE Engineer Manual, Chemical Quality Assurance for HTRW Projects, October 10, 1997.

3.3 Conceptual Site Exposure Model

The conceptual site exposure model (CSEM) provides the basis for identifying and evaluating potential risks to human health in the risk assessment. The CSEM includes all receptors and potential exposure pathways appropriate to all plausible scenarios. The CSEM facilitates consistent and comprehensive evaluation of risk to human health through graphically presenting all possible exposure pathways, including all sources, release and transport pathways, and exposure routes. In addition, the CSEM helps to ensure that potential pathways are not overlooked. The elements of a complete exposure pathway and CSEM are:

- Source (i.e., contaminated environmental) media
- Contaminant release mechanisms
- Contaminant transport pathways
- Receptors
- Exposure pathways.

Contaminant release mechanisms and transport pathways are not relevant for direct receptor contact with a contaminated source medium.

The Former Toxic Gas Area, Parcel 211(7), was previously used as a chemical obstacle course. Therefore, primary contaminant release mechanisms were most likely metals, chemical agent degradation products, explosives, and chemicals used to decontaminate equipment. These chemicals may have entered surface and subsurface soil via spills, leaching, or burial. Other potential contaminant transport pathways include rain runoff and erosion to surface soil, infiltration and leaching to subsurface soil and groundwater, dust emissions and volatilization to ambient air, and biotransfer to deer through browsing. Rain runoff may also have affected the surface water and sediment at the site; however, due to the intermittent nature of these streams, repeated exposures by human receptors are not expected.

Conditions at the site at the present time and conditions expected to occur in the future dictate the selection of receptors used to model current and future risks or hazards at the site. Most of Parcel 211(7) is heavily vegetated with brush and woods. The site is not currently used for any activities on a regular basis. However, because the site is not fenced and is wooded, it is accessible to potential trespassers and may be used for hunting purposes. Therefore, the only plausible receptor evaluated under the current land-use scenario is the recreational site user who hunts. Because the site does not have constant surface water, fish ingestion will not be evaluated. Potential receptor scenarios considered, but not included under current land-use scenarios, are as follows:

- ***National Guardsperson.*** Pelham Range is an active range and future reuse will be for active military training. The site is not currently used by the National Guard.

- ***Groundskeeper.*** The site is not currently maintained by a groundskeeper.

- ***Construction Worker.*** The site is unused, and no development or construction is occurring.

- ***Resident.*** The site is not currently used for residential purposes.

The Former Toxic Gas Area at Pelham Range, Parcel 211(7), is anticipated to be used in the future by the National Guard, although the site may not be deemed safe for public access until remediation has been completed, due to the potential for UXO (EDAW, 1997). Potential receptor scenarios evaluated for the future include the following:

- ***Recreational Site User.*** Because the site will likely not be restricted and trespassing and hunting are possible in the future, the recreational site user is included. Fish ingestion will not be evaluated because surface water is not present on a consistent basis.

- ***Resident.*** Although the site is not expected to be utilized for residential purposes, the resident is considered in order to provide information for the project manager and regulators.

- ***National Guardsperson.*** It is anticipated that the site will be used for training activities by the National Guard in the future.

A summary of relevant contaminant release and transport mechanisms, source and exposure media, and receptor scenarios and exposure pathways for this site is provided in Table 3-1 and Figure 3-1.

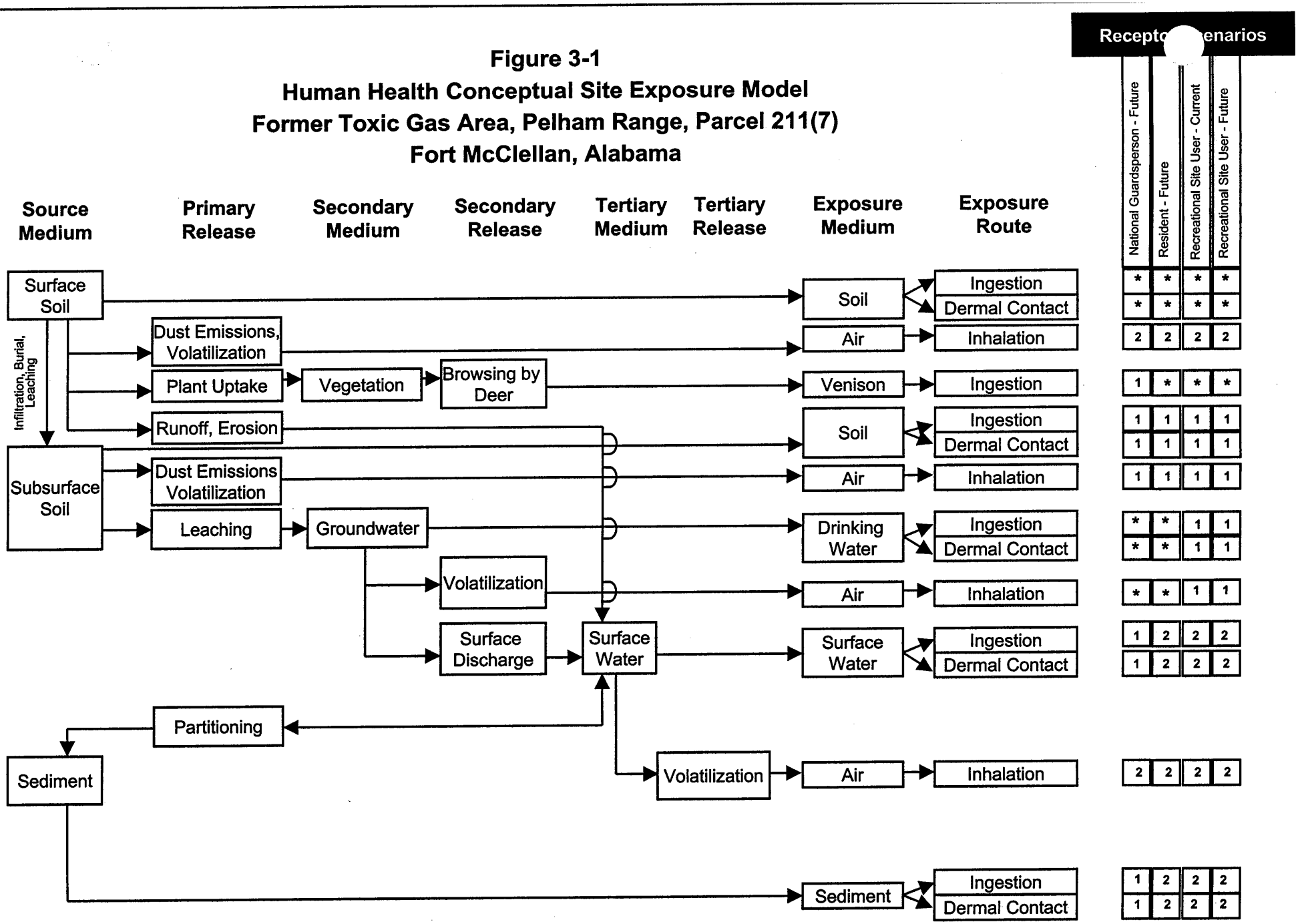
3.4 Decision-Making Process, Data Uses, and Needs

The seven-stage DQO decision-making process is presented in detail in Chapter 3.0 of the QAP and will be followed during the SI at the Former Toxic Gas Area, Parcel 211(7). Data uses and needs are summarized in Table 3-1.

3.4.1 Risk Evaluation

Confirmation of contamination at the Former Toxic Gas Area, Parcel 211(7), will be based on using EPA definitive data to determine whether or not PSSCs are detected in site media. Detected site chemical concentrations will be compared to site-specific screening levels,

Figure 3-1
Human Health Conceptual Site Exposure Model
Former Toxic Gas Area, Pelham Range, Parcel 211(7)
Fort McClellan, Alabama



* = Complete exposure pathway evaluated in the streamlined risk assessment.
1 = Incomplete exposure pathway.
2 = Although theoretically complete, due to the streams on site holding water only intermittently, this pathway is judged to be insignificant and is not evaluated in the streamlined risk assessment.

KN2/4040/P211/FSP/Final/Fig 3-1.ppt/7/31/02 12:30:22 PM

ecological screening values, and background values to determine if PSSCs are present at the site at concentrations that pose an unacceptable risk to human health or the environment. Definitive data will be adequate for confirming the presence of site contamination and for supporting a feasibility study and risk assessment.

3.4.2 Data Types and Quality

Surface soil, subsurface soil, groundwater, and one drum will be sampled and analyzed to meet the objectives of the SI at the Former Toxic Gas Area, Parcel 211(7). Quality assurance/quality control (QA/QC) samples will be collected for all sample media, as described in Chapter 4.0 of this SFSP. Samples will be analyzed by EPA-approved SW-846 Methods Update III, where available, comply with EPA definitive data requirements, and be reported using hard-copy data packages. In addition to meeting the quality needs of this SI, data analyzed at this level of quality are appropriate for all phases of site characterization, remedial investigation, and risk assessment.

3.4.3 Precision, Accuracy, and Completeness

Laboratory requirements of precision, accuracy, and completeness for this SI are defined in Section 3.3 and presented in Chapter 5.0 of the QAP (IT, 2002a).

4.0 Field Activities

4.1 UXO Survey Requirements and Utility Clearances

The Former Toxic Gas Area, Parcel 211(7), is located on Pelham Range, an active range used by both the Alabama National Guard and the Anniston Army Depot for training and weapons testing. There is a possibility of the presence of UXO at the Former Toxic Gas Area, Parcel 211(7); therefore, UXO surface sweeps and downhole surveys of soil borings will be required to support field activities. The surface sweeps and downhole surveys will be conducted to identify anomalies for the purposes of UXO avoidance. The site-specific UXO safety plan attachment has been written in conjunction with Appendix E of the SAP (IT, 2002a).

4.1.1 Surface UXO Survey

A UXO sweep will be conducted over areas that will be included in the sampling and surveying activities to identify UXO on or near the surface that may present a hazard to on-site workers during field activities. Low-sensitivity magnetometers will be used to locate surface and shallow-buried metal objects. UXO located on the surface will be identified and conspicuously marked for easy avoidance. Subsurface metallic anomalies will not be disturbed but will also be marked for easy avoidance. UXO personnel requirements, procedures, and detailed descriptions of the geophysical equipment to be used are provided in Appendix E of the SAP (IT, 2002a).

4.1.2 Downhole UXO Survey

During the soil boring and downhole sampling, downhole UXO surveys will be performed to determine if buried metallic objects are present. UXO monitoring, as described in Appendix E of the SAP (IT, 2002a), will continue until undisturbed soil is encountered or the borehole has been advanced to 12 feet below ground surface (bgs), whichever is reached first.

4.1.3 Utility Clearances

After the UXO surface survey has cleared the area to be sampled and prior to performing any intrusive sampling, a utility clearance will be performed at locations where soil and groundwater samples will be collected, using the procedure outlined in Section 4.2 of the SAP (IT, 2002a). The site manager will mark the proposed locations with stakes, coordinate with the local utility companies to clear the proposed locations for utilities, and obtain digging permits. Once the locations are approved (for both UXO and utility avoidance) for intrusive sampling, the stakes will be labeled as cleared.

4.2 Surface Geophysical Survey

Surface geophysical surveys will be conducted at Parcel 211(7) to map a possible waste disposal site (Figure 4-1). Historical records show that this area was used for storage and disposal of toxic chemical agent believed to have been stored in glass and/or metal containers. The geophysical survey will be conducted over an area approximately 100 feet by 100 feet which encompasses the ground scar identified as a possible disposal site (25 feet by 25 feet) and the surrounding area (physical feature 34, Figure 4-1).

The geophysical techniques to be used to conduct the site screening will include frequency-domain electromagnetics (EM) induction, magnetic survey, and ground-penetrating radar (GPR) techniques. These combined methods offer the technical approach most likely to succeed in accurately locating features such as buried debris, disturbed soils, buried glass, buried metal, and the lateral boundaries of structures. To provide permanent documentation of the geophysical survey area and anomaly locations, IT will produce a site map.

4.2.1 Geophysical Survey

The geophysical survey at Parcel 211(7) will be conducted using frequency-domain EM induction, magnetic survey, and GPR techniques as described below.

Frequency-Domain EM Survey. Frequency-domain EM data will be collected using a Geonics EM31 terrain conductivity meter. Survey data will be acquired with the EM31 operated in the vertical dipole mode at a height of approximately 0.9 meters (approximately 3.0 feet) above the ground surface. The EM31 survey will be conducted along N-S oriented survey lines to accurately map lateral variations in near-surface conductivity to define the lateral extent and continuity of anomalies caused by buried debris (if present). The EM31 survey will include equipment calibration and system checks, data collection, EM31 base station QA/QC readings to monitor instrument drift and repeatability during the investigation, periodic downloading of EM31 data to a laptop personal computer, and data evaluation.

Magnetic Survey. Total magnetic field data will be acquired using a Geometrics Inc., G-858G magnetic gradiometer (G-858G) for survey data collection and a Geometrics Inc., G-856AX for collecting magnetic base station data. The magnetic base station data will be used to "drift correct" the G-858G survey data for diurnal variations that occur in the Earth's magnetic field during the magnetic survey sessions. The G-858G magnetic data will be collected along N-S oriented survey lines to maximize data response from buried source materials. The G-858G will be operated in the vertical gradiometer mode, and data will be acquired with upper and lower

E 601,300

N 1,178,700

E 609,400

N 1,173,100

TO GATE 10

RJ30

203(7)

RANGE K - PARCEL 203(7)

FORMER TOXIC GAS AREA
PARCEL 211(7)

RJ29

RJ28

ORIENTATION
AREA

CONTROL
CENTER
AID STATION

STATION
NO.7

STATION
NO.1

STATION
NO.2

STATION NO.6
(MINES)

TRAINING AREA
10B

RANGE L - PARCEL 204(7)

STATION NO.5
(A-BOMB)

STATION NO.3
(IMPACT AREA)

RIDEOUT HALL
BUILDING-880I

FORMER DECONTAMINATION
TRAINING AREA
PARCEL 207(7)

BURIAL MOUND

BURIAL MOUND
AT RIDEOUT FIELD

201(7)

PROPOSED GEOPHYSICAL
SURVEY LOCATION

RANGE I - PARCEL 201(7)

PR-211-DR01
PR-211-GP11
PR-211-GP10
PR-211-GP03
PR-211-GP05
PR-211-MW08
PR-211-MW09
PR-211-GP04
PR-211-GP02
PR-211-MW07
PR-211-GP01
PR-211-MW06
PR-211-GP09
PR-211-GP06
PR-211-GP08
PR-211-MW10
PR-211-MW11
PR-211-MW12
PR-211-MW13
PR-211-MW14
PR-211-MW15
PR-211-GP07

LEGEND:

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
- PARCEL BOUNDARY
- SEPARATE INVESTIGATION
- TREES / TREELINE
- MARSH / WETLANDS
- SURFACE DRAINAGE / CREEK
- FENCE
- CHEMICAL OBSTACLE COURSE
- RJ ROAD JUNCTION
- PROPOSED SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- PROPOSED SURFACE SOIL SAMPLE LOCATION
- PROPOSED GROUNDWATER, SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- PROPOSED DRUM SAMPLE LOCATION
- EXISTING SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION

PHYSICAL FEATURES OBSERVED

1. U-SHAPED DIRT MOUND
2. 10' x 10' x 3' MOUND
3. 8' x 5' x 2' MOUND WITH EXPENDED SMALL ARMS BLANK CASINGS
4. 6' x 2' x 1' DEPRESSIONS (SEVERAL IN AREA), AND 5' x 3' x 2' CRESCENT SHAPED MOUNDS
5. 10' x 4' x 5' DEPRESSION (METAL IN BOTTOM)
6. THREE 10' x 10' x 2' DEPRESSIONS
7. CONVERGENCE OF TWO UNIMPROVED OVERGROWN ROADS
8. 5' x 5' x 1' CIRCULAR AND RECTANGULAR DEPRESSIONS
9. FOUR DROP (SPRAY) TANKS 5' x 3' (DIAMETER) LABELED: SMOKE, CHEMICAL WARFARE SERVICE USA, NO. M33A1 TANK, AIRPLANE, EDGEWOOD ARSENAL MARYLAND. TWO ARE TORN APART, TWO ARE STILL INTACT, ALL ARE RUSTED AND EMPTY
10. 15' x 10' x 4' U-SHAPED MOUND WITH TWO 10'x4'x3' RECTANGULAR DEPRESSIONS TO THE NORTH
11. 15' x 5' x 4' DEPRESSION, WITH ONE METAL POST TO THE SOUTH
12. TWO WWII ERA TANKS
13. 20' x 10' x 2' DEPRESSION
14. 15' x 15' x 6' DEPRESSION
15. WOODEN PALLET
16. EMPTY STB BARREL LABELED: 3lbs BLEACH/1 GALLON WATER. BARREL APPROXIMATELY 1.5' x 3' (DIAMETER), OPEN AND RUSTED
17. RUSTED SMOKE POT AND MACHINE GUN AMMO BELT / SEVERAL SLAP FLARES
18. FOG OIL DRUM LID / NEAR BY TRENCH AND MOUNDS
19. 5' x 2' x 1' FIGHTING POSITIONS WITH SMOKE GRENADE CANISTER AND EXPENDED SMALL ARMS BLANK CASINGS AROUND FIGHTING POSITIONS
20. 5' x 10' x 5' MANHOLE WITH EXPENDED SMOKE GRENADE
21. 70' x 30' x 5' MANMADE DEPRESSION
22. EXPENDED 81mm ILLUMINATION MORTAR (OLD AND RUSTED)
23. OLD RUSTED MUNITIONS CANISTER
24. 55-GALLON DRUM APPROXIMATELY HALF FULL OF LIQUID AND LYING ON SIDE, RUSTED, NOT LABELED
25. U-SHAPED FIGHTING POSITION (IN SIDE OF HILL)
26. EMPTY 55-GALLON DRUM LABELED: FOG OIL SGFT2 (ON LID), CLOSED, RUSTED, SLIGHTLY GREEN COLORED.
27. 5' x 2' x 1' FIGHTING POSITIONS WITH EXPENDED SMALL ARMS BLANK CASINGS
28. OLD WOODEN FENCE POST
29. DRUM LID CLAMP (NO DRUM)
30. EMPTY 55-GALLON DRUM, APPEARS TO HAVE BEEN USED AS A FIRE PIT
31. 7' x 4' x 3' FIGHTING POSITIONS WITH SMALL ARMS BLANK CASINGS
32. CONCRETE PADS WITH METAL TIE DOWNS. BASE OF FORMER OBSERVATION TOWER
33. FOUR FIGHTING POSITIONS, LARGEST IN U-SHAPE WITH EXTENDED BACK SIDE, APPROXIMATELY 10' x 10' x 4', OTHERS ARE CIRCULAR APPROXIMATELY 5' x 5' x 2', SMALL ARMS BLANK CASINGS AND EXPENDED SLAP FLARES ALSO FOUND IN AREA
34. 25' x 25' GROUND SCAR BETWEEN FENCE POSTS. THREE METAL FENCE POSTS, APPROXIMATELY 3' HIGH, WITH YELLOW PAINTING ON TOP 6"
35. SERIES OF SMALL DEPRESSIONS 1' x 4' x ½' (APPEAR TO BE FOXHOLES)
36. 55-GALLON DRUM WITH NEGLIGIBLE AMOUNT OF MOISTURE (SITTING UPRIGHT)
37. L-SHAPE TRENCH APPROXIMATELY 4' TO 6' (WIDE) x 3' (DEEP)
38. POSSIBLE GROUND SCAR
39. GROUND SCAR
40. TWO SHERMAN TANKS (POSSIBLY USED FOR DECONTAMINATION PROCEDURES)
41. EMPTY RUSTED METAL CANISTERS (THREE RECTANGULAR, TWO CYLINDRICAL)
42. ONE EMPTY RUSTED METAL CANISTER (CYLINDRICAL)
43. 12' x 5' x 5' DEPRESSION WITH RUSTED METAL AND OLD CROSS TIES, POSSIBLY OLD BUNKER
44. FOUR CIRCULAR DEPRESSIONS APPROXIMATELY 8' x 4' x 4'
45. ONE BUILDING (BUNKER) MADE OF CINDER BLOCKS, TWO CINDER BLOCK FOUNDATIONS WITH 150' LONG TRENCH IN BETWEEN (IN HILLSIDE)
46. THREE DEPRESSIONS 3' x 4' x 2'

NOTE:

1. PHYSICAL FEATURES OBSERVED DURING SITE WALK CONDUCTED BY IT JULY/AUGUST 2001 AND JANUARY 2002.

SOURCE: U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTATIVE MEDICINE, "PRELIMINARY ASSESSMENT NO. 38-EH-1775-99, FORT McCLELLAN ARMY NATIONAL GUARD TRAINING CENTER, FORT McCLELLAN, ALABAMA MAY 28 - JUNE 17, 1999."

SCALE
0 300 600 FEET

FIGURE 4-1
PROPOSED SAMPLE LOCATION MAP
FORMER TOXIC GAS AREA
PARCEL 211(7)

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

IT CORPORATION
A Member of The IT Group

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sensors at heights of approximately 4.5 and 2.0 feet above the ground surface, respectively. The G-858G data will be used to screen the site for anomalies typical of those caused by buried ferrous metal. The magnetic survey will include system checks, data collection, G-858G base station QA/QC readings to monitor instrument drift and repeatability during the investigation, periodic downloading of magnetic data to a laptop personal computer, drift-correcting G-858G survey data, and data evaluation.

Ground Penetrating Radar Survey. Digital GPR data will be collected at the site using a GSSI SIR-2P, or equivalent, coupled to 200- and/or 400- megahertz (MHz) antennae. Antenna selection will be dependent on site conditions and signal attenuation. GPR data will be printed in the field using a GSSI Model DPU-5400 high-resolution thermal gray-scale printer. The advantages of including GPR in the survey design are as follows:

- GPR data are useful in locating areas of disturbed soils.
- GPR data are useful in accurately locating and mapping non-metallic materials such as buried glass.
- GPR data are useful in accurately mapping lateral boundaries of structures

The GPR survey will include equipment calibration and system checks, data collection, GPR base station QA/QC readings to verify proper system operation, periodic downloading of GPR data to a personal computer and data evaluation.

4.2.2 Methodology

Geophysical survey work will be designed, conducted, and interpreted by an IT project geophysicist assisted by a second geophysicist. The surveys will be conducted in accordance with the following IT standard operating procedures:

- ITGP-001; Surface Magnetic Surveys
- ITGP-002; Surface Frequency-Domain EM Surveys
- ITGP-003; Ground Penetrating Radar Surveys
- ITGP-012; Geophysical Data Management.

4.2.3 Survey Control

Prior to conducting geophysical work, the project team will provide the geophysics crew with available utility maps for the area. Once the area is identified the crew will mark geophysical survey stations on 10-foot centers throughout each site using surveyor's paint. To the extent

possible, the grids will be oriented in the north to south (N-S) direction. It is assumed that the area will be free of surface debris (e.g., litter and large items) prior to arrival of the geophysics crew. This will allow the crew to immediately begin laying out the survey grids.

After the survey grids are complete and control points are marked, all surface objects that could potentially affect the geophysical data (e.g., reinforced concrete, drainage pathways etc.) will be accurately hand-sketched on site maps so that anomalies caused by these objects can be correctly interpreted. The site maps will include permanent reference features within the survey area and near the perimeter, such that the grid and target anomalies can be relocated in the future. The corners of the survey grid will be staked so that the civil surveyor can locate the site and collect survey location data.

4.2.4 Data Processing

Contour maps of magnetic and EM data representing the site will be generated using the Geosoft OASIS® Montaj geophysical data processing system. The data will be color-enhanced to aid with interpreting subtle anomalies. The data will be processed and interpreted to indicate locations of subsurface anomalies.

Select GPR profiles will be processed using Gradix® data processing and interpretation system from Interpex Limited. The traces will be balanced and processed using an automatic gain control function and a color amplitude function will be chosen to enhance features of interest.

4.2.5 Geophysical Survey Assumptions and Design

It is assumed that an area approximately 100 feet by 100 feet will be investigated. The following geophysical survey design will be implemented during data collection:

- Frequency-domain EM profile data will be collected using an EM31 to screen the site for the presence of conductivity anomalies potentially representing glass disposal areas. EM31 data will be collected along N-S survey lines spaced 10 feet apart. A total of approximately 1,100 linear feet of EM31 data will be acquired during the survey.

- Magnetic data will be collected using a G858G gradiometer to screen the site for anomalies typical of those caused by buried ferrous metal. Magnetic data will be collected along N-S oriented survey lines spaced 5 feet apart. A total of approximately 2,200 linear feet of data will be collected.

- Digital GPR profile data will be collected to screen the site for the presence of possible disturbed soils and excavations containing glass debris. GPR profile data will be collected along N-S survey lines. Depending on site conditions and/or survey results, higher data density coverage will be added as necessary to define anomalies.

4.2.6 Geophysics Report

The geophysics report will include discussions of the technical methods and field procedures used to conduct the geophysical survey (instrument calibration, data QA, survey control procedures), data processing, and the interpreted results. The report will contain select EM and magnetic data maps, GPR profiles and a geophysical interpretation map accurately showing the location of site features such that the survey area and anomalies can be relocated in the future. The geophysics report will be included as an appendix to the SI report for the Toxic Gas Area, Parcel 211(7).

4.3 Environmental Sampling

The environmental sampling program at the Former Toxic Gas Area, Parcel 211(7), includes the collection of surface soil, subsurface soil, groundwater, and the contents of a drum for chemical analysis. These samples will be collected and analyzed to provide data for characterizing the site to determine the environmental condition of the site and any further action to be conducted. Additionally, samples will be collected from environmental media in locations that will assist in the assessment of potential ecological impacts resulting from activities at the site.

4.3.1 Surface Soil Sampling

Surface soil samples will be collected from 17 locations at the Former Toxic Gas Area, Parcel 211(7).

4.3.1.1 Sample Locations and Rationale

The sampling rationale for each surface soil sample location is listed in Table 4-1. Proposed sampling locations are shown in Figure 4-1. Surface soil sample designations and QA/QC sample requirements are summarized in Table 4-2. The final soil boring sampling locations will be determined in the field by the on-site geologist, based on actual field conditions.

4.3.1.2 Sample Collection

Surface soil samples will be collected from the uppermost 1 foot of soil by direct-push methodology as specified in Sections 5.1.1.1 and 6.1.1.1 of the SAP (IT, 2002a). In areas where site access does not permit the use of a direct-push rig, the samples will be collected using a hand

Table 4-1

Sampling Locations and Rationale
Former Toxic Gas Area, Parcel 211(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Media	Sample Location Rationale
PR-211-MW06	Groundwater	Monitoring well for groundwater samples to be placed in the central area of the parcel at the location of the existing soil boring PR-211-GP01, near four M33A1 drop tanks (physical feature 9, Figure 4-1). Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site. Soil boring will be drilled to a depth no greater than 100 feet bgs. If groundwater is not encountered before 100 feet bgs, the boring will be abandoned without installing a well. The monitoring well location will be used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
PR-211-MW07	Groundwater	Boring and monitoring well for groundwater samples to be placed in the central area of the parcel at the location of the existing soil boring PR-211-GP02, near four M33A1 drop tanks (physical feature 9, Figure 4-1). Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site. If groundwater is not encountered before 100 feet bgs, the boring will be abandoned without installing a well. The monitoring well location will be used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
PR-211-MW08	Groundwater, surface soil, and subsurface soil	Boring and monitoring well for surface soil, subsurface soil, and groundwater samples to be placed in the circular depressions (physical feature 44, Figure 4-1) approximately 250 feet west (downslope) of the trench and bunkers. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. If groundwater is not encountered before 100 feet bgs, the boring will be abandoned without installing a well. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes. The monitoring well location will be used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
PR-211-MW09	Groundwater, surface soil, and subsurface soil	Boring and monitoring well for surface soil, subsurface soil, and groundwater samples to be placed on the hillside, west and downslope of the southern bunker and trench (physical feature 45, Figure 4-1). Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. The boring will be drilled to a depth no greater than 100 feet bgs. If groundwater is not encountered before 100 feet bgs, the soil boring will be abandoned without installing a well. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes. The monitoring well location will be used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
PR-211-MW10	Groundwater, surface soil, and subsurface soil	Boring and monitoring well for surface soil, subsurface soil, and groundwater samples to be placed approximately 25 feet northwest and downslope of two WWII era tanks possibly used for CWA training (physical feature 12, Figure 4-1). Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil boring will be drilled to a depth no greater than 100 feet bgs. If groundwater is not encountered before 100 feet bgs, the soil boring will be abandoned without installing a well. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes. The monitoring well location will be used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.

Table 4-1

Sampling Locations and Rationale
Former Toxic Gas Area, Parcel 211(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Media	Sample Location Rationale
PR-211-MW11	Groundwater, surface soil, and subsurface soil	Boring and monitoring well for surface soil, subsurface soil, and groundwater samples to be placed approximately 10 feet west (downslope) of two WWI era tanks possibly used for CWA training (physical feature 12, Figure 4-1). Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. If groundwater is not encountered before 100 feet bgs, the soil boring will be abandoned without installing a well. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes. The monitoring well location will be used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
PR-211-MW12	Groundwater, surface soil, and subsurface soil	Boring and monitoring well for surface soil, subsurface soil, and groundwater samples to be placed approximately 10 feet east of two WWII-era tanks (physical feature 40, Figure 4-1). Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. If groundwater is not encountered before 100 feet bgs, the soil boring will be abandoned without installing a well. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes. The monitoring well location will be used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
PR-211-MW13	Groundwater, surface soil, and subsurface soil	Boring and monitoring well for surface soil, subsurface soil, and groundwater samples to be placed approximately 25 feet southeast (downslope) of two WWII era tanks (physical feature 40, Figure 4-1). Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. If groundwater is not encountered before 100 feet bgs, the soil boring will be abandoned without installing a well. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes. The monitoring well location will be used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
PR-211-MW14	Groundwater, surface soil, and subsurface soil	Boring and monitoring well for surface soil, subsurface soil, and groundwater samples to be placed near an empty STB drum (physical feature 16, Figure 4-1), in an area believed to be a decontamination station. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. If groundwater is not encountered before 100 feet bgs, the soil boring will be abandoned without installing a well. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes. The monitoring well location will be used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
PR-211-MW15	Groundwater, surface soil, and subsurface soil	Boring and monitoring well for surface soil, subsurface soil, and groundwater samples to be placed in the sparse vegetation area (physical feature 34, Figure 4-1) at the south west end of the parcel. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. If groundwater is not encountered before 100 feet bgs, the soil boring will be abandoned without installing a well. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes. The monitoring well location will be used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.

Table 4-1

Sampling Locations and Rationale
Former Toxic Gas Area, Parcel 211(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Media	Sample Location Rationale
PR-211-GP03	Surface soil and Subsurface soil	Soil boring for surface soil and subsurface soil to be placed at the location of a fog oil storage drum (physical feature 26, Figure 4-1). Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
PR-211-GP04	Surface Soil	Soil boring for surface soil to be placed around the rusted metal canisters (physical feature 41, Figure 4-1). Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
PR-211-GP05	Surface Soil	Soil boring for surface soil to be placed in a depression east of Range K (physical feature 44, Figure 4-1). Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
PR-211-GP06	Surface Soil	Soil boring for surface soil to be placed at the location of an 81mm illumination mortar (physical feature 22, Figure 4-1). Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
PR-211-GP07	Surface soil and Subsurface soil	Soil boring for surface soil to be placed approximately 15 feet southeast of a sparse vegetation area (physical feature 34, Figure 4-1). Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
PR-211-GP08	Surface soil	Soil boring for surface soil to be placed at the location of a ground scar (physical feature 39, Figure 4-1). Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
PR-211-GP09	Surface soil	Soil boring for surface soil to be placed in a depression east of Lima Pond (physical feature 14, Figure 4-1). Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
PR-211-GP10	Surface soil	Soil boring for surface soil to be placed in a depression on a hillside in the western portion of the site (physical feature 5, Figure 4-1). Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.

Table 4-1

Sampling Locations and Rationale
Former Toxic Gas Area, Parcel 211(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Media	Sample Location Rationale
PR-211-GP11	Surface and Subsurface soil	Soil boring for surface and subsurface soil to be placed at the location of a half-full 55-gallon drum (physical feature 24, Figure 4-1). Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
PR-211-DR01	Drum	Sample taken directly from drum to ascertain the contents of the drum.

Notes:

Sample locations PR-211-MW01 through PR-211-MW05, PR-211-GP01, and PR-211-GP02 have been previously collected during the SI at Station No. 6, Subsection of Former Gas Area, Parcel 211(7).

Table 4-2

Soil Sample Designations and Analytical Parameters
Site Investigation
Fomer Toxic Gas Area, Parcel 211(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft)	QA/QC Samples		Analytical Suite
			Field Duplicates	MS/MSD	
PR-211-GP03	PR-211-GP03-SS-NQ0018-REG	0-1	PR-211-GP03-SS-NQ0019-FD		VOCs, SVOCs, TAL Metals and Explosives.
	PR-211-GP03-DS-NQ0020-REG	a			
PR-211-GP04	PR-211-GP04-SS-NQ0021-REG	0-1		PR-211-GP04-SS-NQ0021-MS/MSD	VOCs, SVOCs, TAL Metals and Explosives.
PR-211-GP05	PR-211-GP05-SS-NQ0022-REG	0-1			VOCs, SVOCs, TAL Metals and Explosives.
PR-211-GP06	PR-211-GP06-SS-NQ0023-REG	0-1			VOCs, SVOCs, TAL Metals and Explosives.
PR-211-GP07	PR-211-GP07-SS-NQ0024-REG	0-1			VOCs, SVOCs, TAL Metals, Explosives and CWM Breakdown Products.
	PR-211-GP07-DS-NQ0025-REG	a			
PR-211-GP08	PR-211-GP08-SS-NQ0026-REG	0-1			VOCs, SVOCs, TAL Metals and Explosives.
PR-211-GP09	PR-211-GP09-SS-NQ0027-REG	0-1			VOCs, SVOCs, TAL Metals and Explosives.
	PR-211-GP09-DS-NQ0028-REG	a			
PR-211-GP10	PR-211-GP10-SS-NQ0029-REG	0-1			VOCs, SVOCs, TAL Metals and Explosives.
	PR-211-GP10-DS-NQ0030-REG	a			
PR-211-GP11	PR-211-GP11-SS-NQ0031-REG	0-1			VOCs, SVOCs, TAL Metals and Explosives.
	PR-211-GP11-DS-NQ0032-REG	a			
PR-211-MW08	PR-211-MW08-SS-NQ0033-REG	0-1			VOCs, SVOCs, TAL Metals and Explosives.
	PR-211-MW08-DS-NQ0034-REG	a			
PR-211-MW09	PR-211-MW09-SS-NQ0035-REG	0-1			VOCs, SVOCs, TAL Metals and Explosives.
	PR-211-MW09-DS-NQ0036-REG	a		PR-211-MW09-DS-NQ0036-MS/MSD	

Table 4-2

Soil Sample Designations and Analytical Parameters
Site Investigation
Fomer Toxic Gas Area, Parcel 211(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft)	QA/QC Samples		Analytical Suite
			Field Duplicates	MS/MSD	
PR-211-MW10	PR-211-MW10-SS-NQ0037-REG	0-1			VOCs, SVOCs, TAL Metals, Explosives and CWM Breakdown Products.
	PR-211-MW10-DS-NQ0038-REG	a			
PR-211-MW11	PR-211-MW11-SS-NQ0039-REG	0-1			VOCs, SVOCs, TAL Metals, Explosives and CWM Breakdown Products.
	PR-211-MW11-DS-NQ0040-REG	a			
PR-211-MW12	PR-211-MW12-SS-NQ0041-REG	0-1			VOCs, SVOCs, TAL Metals, Explosives and CWM Breakdown Products.
	PR-211-MW12-DS-NQ0042-REG	a			
PR-211-MW13	PR-211-MW13-SS-NQ0043-REG	0-1			VOCs, SVOCs, TAL Metals, Explosives and CWM Breakdown Products.
	PR-211-MW13-DS-NQ0044-REG	a			
PR-211-MW14	PR-211-MW14-SS-NQ0045-REG	0-1	PR-211-MW14-SS-NQ0046-FD		VOCs, SVOCs, TAL Metals and Explosives.
	PR-211-MW14-DS-NQ0047-REG	a			
PR-211-MW15	PR-211-MW15-SS-NQ0048-REG	0-1	PR-211-MW15-SS-NQ0049-FD		VOCs, SVOCs, TAL Metals, Explosives and CWM Breakdown Products.
	PR-211-MW15-DS-NQ0050-REG	a			

[a] Actual sample depth selected for analysis will be at the discretion of the site geologist and will be based on field observation.

Note: Soil sample locations PR-211-MW01 through PR-211-MW05, PR-211-GP01, and PR-211-GP02 have been previously collected during the SI at Station No. 6, Subsection of Former Toxic Gas Area, Parcel 211(7).

CWM - Chemical warfare materiel.
Explosives - Nitroaromatic and nitramine.
FD - Field duplicate.
MS/MSD - Matrix spike/matrix spike duplicate.
QA/QC - Quality assurance/quality control.
REG - Field sample.
SVOCs - Semivolatile organic compounds.
TAL - Target analyte list.
VOCs - Volatile organic compounds.

auger as specified in Sections 5.1.1.2 and 6.1.1.1 of the SAP (IT, 2002a). Collected soil samples will be screened using a photoionization detector (PID) in accordance with Section 6.8.3 of the SAP. Surface soil samples will be screened for information purposes only, not to aid in the selection of samples for analysis. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SFSP are discussed in Chapter 4.0, and listed in Table 4-1, of the QAP. Sample documentation and chain-of-custody (COC) will be recorded as specified in Chapter 6.0 of the SAP. The samples will be analyzed for the parameters listed in Section 4.6 of this SFSP.

4.3.2 Subsurface Soil Sampling

Subsurface soil samples will be collected from 9 borings and 4 monitoring well locations installed at the Former Toxic Gas Area, Parcel 211(7).

4.3.2.1 Sample Locations and Rationale

Subsurface soil samples will be collected from the proposed soil boring locations shown on Figure 4-1. The sampling rationale for each subsurface soil sample location is listed in Table 4-1. Subsurface soil sample designations and QA/QC sample requirements are listed in Table 4-2. The final soil boring sampling locations will be determined in the field by the on-site geologist, based on actual field observations and utility clearance results.

4.3.2.2 Sample Collection

Subsurface soil samples will be collected from soil borings at a depth greater than 1 foot bgs in the unsaturated zone. The soil borings will be advanced and soil samples collected using the direct-push sampling procedures specified in Sections 5.1.1.1 and 6.1.1.1 of the SAP (IT, 2002a). In areas where site access does not permit the use of a direct-push rig, the samples will be collected using a hand auger as specified in Sections 5.1.1.2 and 6.1.1.1 of the SAP (IT, 2002a).

Soil samples will be collected continuously for the first 12 feet, or until either groundwater or sampler refusal is reached. A detailed lithogical log will be recorded by the on-site geologist for each borehole. At least one subsurface soil sample from each borehole will be selected for analysis. The collected subsurface soil samples will be field-screened using a PID in accordance with Section 6.8.3 of the SAP to measure samples exhibiting elevated readings exceeding background (readings in ambient air). Typically, the sample showing the highest reading (above background) will be selected and sent to the laboratory for analysis. If none of the samples indicates a reading exceeding background using the PID, the deepest interval from the soil boring will be sampled and submitted to the laboratory for analysis. Subsurface soil samples may be

selected for analysis from any depth interval if the on-site geologist suspects PSSCs at the interval. Site conditions such as lithology may also determine the actual sample depth interval submitted for analysis. More than one subsurface soil sample will be collected if field measurements and observations indicate a possible layer of PSSCs and/or additional sample data would provide insight to the existence of any PSSCs.

Sample documentation and COC will be recorded as specified in Chapter 6.0 of the SAP. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SFSP are discussed in Chapter 4.0, and listed in Table 4-1, of the QAP. The samples will be analyzed for the parameters listed in Section 4.6 of this SFSP.

4.3.3 Drum Sampling and Removal

Drum removal and sampling activities at the Toxic Gas Area will be conducted in accordance with the SSHP and site-specific UXO safety plan attachments included herein. Field activities will be conducted in the following order:

- UXO personnel will conduct surface surveys of foot paths and vehicular lanes to clear the investigation site for potential UXO. The boundaries of the access routes and investigation site will be clearly marked.

- UXO and health and safety personnel will set up the exclusion zone, contamination reduction zone, and the support zone for the drum removal and sampling activities.

- An evaluation of the drum site will be made to determine if excavation is required to further expose the drum to allow adequate access. If required, minimal excavation will be carefully conducted using hand tools (shovels, etc.) to obtain appropriate drum surface area to penetrate the drum.

- If the drum is sealed, a remote drum punch will be utilized to puncture the drum to reach the interior contents.

- After the drum is penetrated, samples of the contents will be collected following the procedures listed in the *IT Drum Sampling Standard Operating Procedure* provided in Attachment 2 of this sampling plan.

- After the samples have been collected, the drum will be sealed and covered with plastic until the results of the samples are received and evaluated.

- If it is determined that the drum is empty, the drum will be fully excavated, transported to a decontamination station, rinsed, crushed, and disposed of as scrap metal. If the drum contents are non-hazardous, the drum will be overpacked until

disposal procedures are determined. Excavated soil will be placed into roll-off bins and disposed of as investigation-derived waste.

- After the drum sample results have been evaluated and it is determined that the drum can be removed, the drum will be further excavated using either hand tools or a backhoe, removed from the excavation, and placed on plastic sheeting. If the drum contains liquids, a temporary containment berm will be constructed to contain potential spills until the drum can be overpacked.

- Final disposition of the drum will be determined based on the sample results of the drum contents, if any. The drum will be overpacked to avoid spillage and in preparation for disposal.

4.3.3.1 Sample Location and Rationale

After the drum has been penetrated using the remote drum punch, a sample will be collected from the contents of the unlabelled 55-gallon drum as shown on Figure 4-1. The sampling rationale for the drum sample is listed in Table 4-1. Drum sample designations and QA/QC sample requirements are summarized in Table 4-3.

4.3.3.2 Sample Collection

At least one sample will be collected from the drum following the procedures outlined in the attached *IT Drum Sampling Standard Operating Procedure* (Attachment 2). If two or more layers or sample media are observed in the drum, a representative sample of each layer or sample medium will be collected for analyses.

Sample documentation and COC will be recorded as specified in Chapter 6.0 of the SAP. Sample containers, sample volumes, preservatives, and holding times for the analyses required in the SFSP are listed in Chapter 4.0, Table 4-1 of the QAP (IT, 2002a). The samples will be analyzed for the parameters listed in Section 4.6 of the SFSP.

4.3.3.3 Excavated Soil

Excavated soil from the vicinity of the drum will be handled as IDW and will be placed into roll-off bins. After the drum removal excavation is complete, a representative sample of the excavated soil will be collected to determine proper disposal.

4.3.4 Permanent Monitoring Wells

Ten permanent monitoring wells will be installed at the Former Toxic Gas Area, Parcel 211(7). The permanent monitoring well locations are shown on Figure 4-1. The rationale for each monitoring well location is presented in Table 4-1. Monitoring wells will be installed using a

Table 4-3

Drum Sample Designation and QA/QC Sample Quantities
Site Investigation
Former Toxic Gas Area, Parcel 211(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation[a]	QA/QC Samples		Analytical Suite
		Field Duplicates	MS/MSD	
PR-211-DR01	PR-211-DR01-DR-NQ4001-REG	PR-211-DR01-DR-NQ4002-FD		VOCs, SVOCs, and TAL Metals

[a] Sample will be collected from inside a 55-gallon drum.

FD - Field duplicate.
MS/MSD - Matrix spike/matrix spike duplicate.
QA/QC - Quality assurance/quality control.
REG - Regular sample.
SVOCs - Semivolatile organic compounds.
VOCs - Volatile organic compounds.
TAL - Target analyte list.

truck-mounted hollow-stem auger drill rig, or an air rotary drill rig if hollow-stem auger refusal is encountered before groundwater or competent bedrock. The monitoring well boreholes will be drilled to the top of bedrock or until adequate groundwater is encountered to install a well with 10 to 20 feet of screen. The monitoring well boreholes will be drilled to a depth no greater than 100 feet bgs. If groundwater is not encountered above 100 feet bgs, the borehole will be abandoned without installing a monitoring well.

The monitoring well casing will consist of new 2-inch inside-diameter (ID), Schedule 40, threaded, flush-joint polyvinyl chloride (PVC) pipe. Attached to the bottom of the well casing will be a section of new threaded, flush-joint, 0.010-inch continuous wrap PVC well screen, approximately 10 to 20 feet long. At the discretion of the IT site manager, a sump (consisting of new, 2-inch ID, Schedule 40, threaded, flush-joint PVC) may be attached to the bottom of the well screen. After the casing and screen materials are lowered into the boring, a filter pack will be installed around the well screen. In wells installed to depths of 20 feet or less, the filter pack material will be gravity filled. In wells installed to depths greater than 20 feet, the filter pack will be tremied into place. The filter pack will be installed from the bottom of the well to approximately five feet above the top of the well screen. The filter pack will consist of 20/40 silica sand. A fine sand (30/70 silica sand), approximately five feet thick, may be placed above the filter pack. A bentonite seal, approximately five feet thick, will be placed above the filter pack (or fine sand, if used). The remaining annular space will be grouted with a bentonite-cement mixture, using approximately 7 to 8 gallons of water and approximately 5 pounds of bentonite per 94-pound bag of Type I or Type II Portland cement. The grout will be tremied into place from the top of the bentonite seal to ground surface. Monitoring wells will be completed with stick-up or flush-mount construction as determined by the site geologist based on site conditions.

Soil samples for lithology will be collected starting at five feet bgs, and at five-foot intervals thereafter, to the total depth of the borehole. Lithologic samples will be collected and described to provide a detailed lithologic log. The samples will be collected using a 24-inch-long, 2-inch-or-larger-diameter split-spoon sampler. However, if air rotary drilling methods are used, split-spoon samples will not be collected. The soil borings will be logged in accordance with American Standard for Testing and Materials Method D 2488 using the Unified Soil Classification System. The soil samples will be screened in the field for the presence of volatile organic compound contamination using a PID. The monitoring wells will be drilled, installed, and developed as specified in Section 5.1 and Appendix C of the SAP (IT, 2002a). The exact monitoring well locations will be determined in the field by the on-site geologist, based on actual

field conditions. Monitoring wells will be allowed to equilibrate for 14 days after well development prior to collecting groundwater samples.

4.3.5 Groundwater Sampling

Groundwater samples will be collected from the 10 monitoring wells completed at the Former Toxic Gas Area, Parcel 211(7), as presented in Section 4.3.4.

4.3.5.1 Sample Locations and Rationale

Groundwater samples will be collected from the monitoring well locations shown on Figure 4-1. The groundwater sampling rationales are listed in Table 4-1. The groundwater sample designations, depths, and required QA/QC sample quantities are listed in Table 4-4.

4.3.5.2 Sample Collection

Prior to sampling monitoring wells, static water level will be measured at each of the monitoring wells installed at the site to define the groundwater flow in the residuum aquifer. Water level measurements will be performed as outlined in Section 5.5 of the SAP (IT, 2002a). Groundwater samples will be collected in accordance with the procedures outlined in Section 6.1.1.5 and Attachment 5 of the SAP. Low-flow groundwater sampling methodology outlined in Attachment 5, Procedure No. FTMC-GW-001, of the SAP (IT, 2002a) may be used as deemed necessary by the IT site manager.

Sample documentation and COC will be recorded as specified in Chapter 6.0 of the SAP. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SFSP are listed in Chapter 4.0, Table 4-1 of the QAP (IT, 2002a). The samples will be analyzed for the parameters listed in Section 4.6 of this SFSP.

4.4 Decontamination Requirements

Decontamination will be performed on sampling and non-sampling equipment to prevent cross-contamination between sampling locations. Decontamination of sampling equipment will be performed in accordance with the requirements presented in Section 6.5.1.1 of the SAP (IT, 2002a). Decontamination of non-sampling equipment will be performed in accordance with the requirements presented in Section 6.5.1.2 of the SAP.

4.5 Surveying of Sample Locations

Sampling locations will be marked with pin flags, stakes, and/or flagging and will be surveyed using either global positioning system (GPS) or conventional civil survey techniques, as

Table 4-4

Groundwater Sample Designation and Analytical Parameters
Site Investigation, Former Toxic Gas Area, Parcel 211(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation[a]	QA/QC Samples		Analytical Suite
		Field Duplicates	MS/MSD	
PR-211-MW06	PR-211-MW06-GW-NQ3007-REG	PR-211-MW06-GW-NQ3008-FD		VOCs, SVOCs, TAL Metals, Explosives, and CWM Breakdown Products.
PR-211-MW07	PR-211-MW07-GW-NQ3009-REG		PR-211-MW07-GW-NQ3009-MS/MSD	VOCs, SVOCs, TAL Metals, Explosives, and CWM Breakdown Products.
PR-211-MW08	PR-211-MW08-GW-NQ3010-REG			VOCs, SVOCs, TAL Metals and Explosives.
PR-211-MW09	PR-211-MW09-GW-NQ3011-REG			VOCs, SVOCs, TAL Metals and Explosives.
PR-211-MW10	PR-211-MW10-GW-NQ3012-REG			VOCs, SVOCs, TAL Metals, Explosives, and CWM Breakdown Products.
PR-211-MW11	PR-211-MW11-GW-NQ3013-REG			VOCs, SVOCs, TAL Metals, Explosives, and CWM Breakdown Products.
PR-211-MW12	PR-211-MW12-GW-NQ3014-REG			VOCs, SVOCs, TAL Metals, Explosives, and CWM Breakdown Products .
PR-211-MW13	PR-211-MW13-GW-NQ3015-REG			VOCs, SVOCs, TAL Metals, Explosives, and CWM Breakdown Products.

Table 4-4

Groundwater Sample Designation and Analytical Parameters
Site Investigation, Former Toxic Gas Area, Parcel 211(7)
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation[a]	QA/QC Samples		Analytical Suite
		Field Duplicates	MS/MSD	
PR-211-MW14	PR-211-MW14-GW-NQ3016-REG			VOCs, SVOCs, TAL Metals and Explosives.
PR-211-MW15	PR-211-MW15-GW-NQ3017-REG			VOCs, SVOCs, TAL Metals, Explosives, and CWM Breakdown Products.

[a] Groundwater samples will be collected from the approximate top 5 to 10 feet of the water column per Attachment 5 of the Installation-Wide Sampling and Analysis Plan (IT, 2002a).

Note: Groundwater sample locations PR-211-MW01 through PR-211-MW05 have been previously collected during the SI at Station No. 6, Subsection of Former Toxic Gas Area, Parcel 211(7).

CWM - Chemical warfare material.
Explosives - Nitroaromatic and nitramine.
FD - Field duplicate.
MS/MSD - Matrix spike/matrix spike duplicate.
QA/QC - Quality assurance/quality control.
REG - Field sample.
SVOCs - Semivolatile organic compounds.
TAL - Target analyte list.
VOCs - Volatile organic compounds.

necessary to obtain the required level of accuracy. Horizontal coordinates will be referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum of 1983. Elevations will be referenced to the North American Vertical Datum of 1988.

Horizontal coordinates for soil sample locations and the drum location will be recorded using a GPS to provide accuracy within 1 meter. Because of the need to use permanent monitoring wells to determine water levels, a higher level of accuracy is required. Monitoring wells will be surveyed to an accuracy of 0.1 foot for horizontal coordinates and 0.01 foot for elevations, using survey-grade GPS techniques and/or conventional civil survey techniques, as required. Procedures to be used for GPS surveying are described in Section 4.4.1.1 of the SAP. Conventional land survey requirements are presented in Section 4.4.1.2 of the SAP.

4.6 Analytical Program

Samples collected at locations specified in this SFSP will be analyzed for a specific suite of chemicals and elements based on the history of site usage, as well as EPA, ADEM, FTMC, and USACE requirements. Target analyses for samples collected from the Former Toxic Gas Area, Parcel 211(7), consist of the following list of analytical suites:

- Target analyte metals - Method 6010B/7000
- Nitroaromatic/nitramine explosives – Method 8330
- Target compound list (TCL) VOCs - Method 5035/8260B
- TCL SVOCs - Method 8270C.

A select number of samples will be analyzed for a further suite that includes:

- CWM breakdown products – Method 8321/8270M.

The drum sample will be analyzed for:

- Target analyte metals – Method 6010B/7000
- TCL VOCs – Method 5035/8260B
- TCL SVOCs – Method 8270C.

The samples will be analyzed using EPA SW-846 methods, including Update III Methods where applicable, as presented in Table 4-5 in this SFSP and Chapter 5.0 of the QAP. Data will be reported in accordance with the definitive data requirements of Chapter 2 of the USACE

Table 4-5

Analytical Samples
Site Investigation, Former Toxic Gas Area, Parcel 211(7)
Fort McClellan, Calhoun County, Alabama

Parameters	Analysis Method	Sample Matrix	TAT Needed	Field Samples: No. of Sample Points	Field Samples: No. of Events	Field Samples: No. of Field Samples	QA/QC Samples[a]: Field Dups (10%)	QA/QC Samples[a]: MS/MSD (5%)	QA/QC Samples[a]: Trip Blank (1/ship)	QA/QC Samples[a]: Eq. Rinse (1/wk/matrix)	EMAX Total No. Analysis
Parcel 211(7): 10 groundwater, 30 soil matrix samples (17 surface and 13 subsurface soil samples), and 1 drum sample.											
Samples will be analyzed for the following parameters:											
Nitroaromatic/nitramine explosives	8330	water	normal	10	1	10	1	1	0	1	14
TAL Metals	6010B/7000	water	normal	10	1	10	1	1	0	1	14
TCL VOCs	8260B	water	normal	10	1	10	1	0	2	1	14
TCL SVOCs	8270C	water	normal	10	1	10	1	0	0	1	12
CWM Breakdown Products	8270M/8321	water	normal	7	1	7	1	0	0	1	9
Nitroaromatic/nitramine explosives	8330	soil	normal	30	1	30	3	2	0	1	38
TAL Metals	6010B/7000	soil	normal	30	1	30	3	2	0	1	38
TCL VOCs	8260B	soil	normal	30	1	30	3	2	0	1	38
Nitroaromatic/nitramine explosives	8270C	soil	normal	30	1	30	3	2	0	1	38
CWM Breakdown Products	8270M/8321	soil	normal	12	1	12	1	0	0	1	14
TAL Metals	6010B/7000	drum content		1	1	1	1	0	0	1	3
TCL VOCs	8260B	drum content		1	1	1	1	0	0	1	3
TCL SVOCs	8270C	drum content		1	1	1	1	0	0	1	3
Parcel 211(7) Subtotal:				182			21	10	2	13	238

[a]Field duplicate, QA split, and MS/MSD samples were calculated as a percentage of the field samples collected per site and were rounded to the nearest whole number. Trip blank samples will be collected with water matrix samples for VOC analysis only. Assumed four field samples per day to estimate trip blanks. Equipment blanks will be collected once per event whenever sampling equipment is field decontaminated and re-used. They will be repeated weekly for sampling events that last more than 1 week. Assumed 20 field samples will be collected per week to estimate number of equipment blanks.

CWM - Chemical warfare material.
MS/MSD - Matrix spike/matrix spike duplicate.
Explosives - Nitroaromatic and nitramine.
QA/QC - Quality assurance/quality control.
SVOCs - Semivolatile organic compounds.
TAL - Target analyte list.
TAT - Turn-around time.
TCL - Target compound list.
VOCs - Volatile organic compounds.

Ship samples to: EMAX Laboratories, Inc.

1835 205th Street
Torrance, CA 90501
Attn: Elizabeth McIntyre
Tel: 310-618-8889
Fax: 310-618-0818

Engineer Manual 200-1-6, *Chemical Quality Assurance For Hazardous, Toxic and Radioactive Waste (HTRW) Projects* (USACE, 1997), and evaluated by the stipulated requirements for the generation of definitive data (Section 7.2.2 of the QAP). Chemical data will be reported by the laboratory via hard-copy data packages using Contract Laboratory Program-like forms, along with electronic copies. These packages will be validated in accordance with EPA National Functional Guidelines by Level III criteria.

4.7 Sample Preservation, Packaging, and Shipping

Sample preservation, packaging, and shipping will follow the procedures specified in Sections 6.1.3 through 6.1.7 of the SAP (IT, 2002a). Completed analysis request/COC records will be secured and included with each shipment of coolers to:

Attn: Sample Receiving/Elizabeth McIntyre
EMAX Laboratories, Inc.
1835 205th Street
Torrance, California 90501
Telephone: (310) 618-8889.

4.8 Investigation-Derived Waste Management

Management and disposal of the IDW will follow procedures and requirements described in Appendix D of the SAP (IT, 2002a). The IDW expected to be generated at the Former Toxic Gas Area, Parcel 211(7), will include decontamination fluids, drill cuttings, purge water, and disposable personal protective equipment. Sampling of IDW to obtain analytical results for characterizing the waste for disposal will follow the procedures specified in Section 6.1.1.8 of the SAP (IT, 2002a).

4.9 Site-Specific Safety and Health

Health and safety requirements for this SI are provided in the SSHP attachment for the Former Toxic Gas Area, Parcel 211(7). The SSHP attachment will be used in conjunction with the installation-wide safety and health plan, Appendix A of the SAP (IT, 2002a).

5.0 Project Schedule

The project schedule for the SI activities will be provided by the IT project manager to the Base Realignment and Closure Cleanup Team.

6.0 References

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U.S. Army Corps of Engineers (USACE), 1999, ***Archives Search Report, Ordnance and Explosives Chemical Warfare Materials, Pelham Range, Anniston, Alabama, Draft Report,*** December.

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U.S. Departments of the Army and Air Force, 1963, ***Military Chemistry and Chemical Agents***, U.S. Department of Commerce, National Technical Information Service, December.

U.S. Environmental Protection Agency (EPA), 2000, ***Guidance for the Data Quality Objectives Process***, EPA 600/R-96-005, August.

ATTACHMENT 1

LIST OF ABBREVIATIONS AND ACRONYMS

List of Abbreviations and Acronyms

2,4-D	2,4-dichlorophenoxyacetic acid
2,4,5-T	2,4,5-trichlorophenoxyacetic acid
2,4,5-TP	silvex
3D	3D International Environmental Group
AB	ambient blank
AbB3	Anniston gravelly clay loam, 2 to 6 percent slopes, severely eroded
AbC3	Anniston gravelly clay loam, 6 to 10 percent slopes, severely eroded
AbD3	Anniston and Allen gravelly clay loams, 10 to 15 percent slopes, eroded
Abs	skin absorption
ABS	dermal absorption factor
AC	hydrogen cyanide
ACAD	AutoCadd
AcB2	Anniston and Allen gravelly loams, 2 to 6 percent slopes, eroded
AcC2	Anniston and Allen gravelly loams, 6 to 10 percent slopes, eroded
AcD2	Anniston and Allen gravelly loams, 10 to 15 percent slopes, eroded
AcE2	Anniston and Allen gravelly loams, 15 to 25 percent slopes, eroded
ACGIH	American Conference of Governmental Industrial Hygienists
AdE	Anniston and Allen stony loam, 10 to 25 percent slope
ADEM	Alabama Department of Environmental Management
ADPH	Alabama Department of Public Health
AEC	U.S. Army Environmental Center
AEL	airborne exposure limit
AET	adverse effect threshold
AF	soil-to-skin adherence factor
AHA	ammunition holding area
AL	Alabama
ALAD	-aminolevulinic acid dehydratase
amb.	Amber
amsl	above mean sea level
ANAD	Anniston Army Depot
AOC	area of concern
APEC	areas of potential ecological concern
APT	armor-piercing tracer
AR	analysis request
ARAR	applicable or relevant and appropriate requirement
AREE	area requiring environmental evaluation
ASP	Ammunition Supply Point
ASR	Archives Search Report
AST	aboveground storage tank
ASTM	American Society for Testing and Materials
AT	averaging time
ATSDR	Agency for Toxic Substances and Disease Registry
ATV	all-terrain vehicle
AWARE	Associated Water and Air Resources Engineers, Inc.
AWWSB	Anniston Water Works and Sewer Board
'B'	Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero)
BCF	blank correction factor; bioconcentration factor
BCT	BRAC Cleanup Team
BERA	baseline ecological risk assessment
BEHP	bis(2-ethylhexyl)phthalate
BFB	bromofluorobenzene
BFE	base flood elevation
BG	Bacillus globigii
bgs	below ground surface
BHC	betahexachlorocyclohexane
BHHRA	baseline human health risk assessment
BIRTC	Branch Immaterial Replacement Training Center
bkg	background
bls	below land surface
BOD	biological oxygen demand
Bp	soil-to-plant biotransfer factors
BRAC	Base Realignment and Closure
Braun	Braun Intertec Corporation
BSAF	biota-to-sediment accumulation factors
BSC	background screening criterion
BTAG	Biological Technical Assistance Group
BTEX	benzene, toluene, ethyl benzene, and xylenes
BTOC	below top of casing
BTV	background threshold value
BW	biological warfare; body weight
BZ	breathing zone; 3-quinuclidinyl benzilate
C	ceiling limit value
Ca	carcinogen
CAB	chemical warfare agent breakdown products
CAMU	corrective action management unit
CBR	chemical, biological and radiological
CCAL	continuing calibration
CCB	continuing calibration blank
CCV	continuing calibration verification
CD	compact disc
CDTF	Chemical Defense Training Facility
CEHNC	U.S. Army Engineering and Support Center, Huntsville
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERFA	Community Environmental Response Facilitation Act
CESAS	Corps of Engineers South Atlantic Savannah
CF	conversion factor
CFC	chlorofluorocarbon
CFDP	Center for Domestic Preparedness
CFR	Code of Federal Regulations
CG	carbonyl chloride (phosgene)
CGI	combustible gas indicator
ch	inorganic clays of high plasticity
CHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
CK	cyanogen chloride
cl	inorganic clays of low to medium plasticity
Cl	chlorinated
CLP	Contract Laboratory Program
cm	centimeter
CN	chloroacetophenone
CNB	chloroacetophenone, benzene, and carbon tetrachloride
CNS	chloroacetophenone, chloropicrin, and chloroform
CO	carbon monoxide
Co-60	cobalt-60
CoA	Code of Alabama
COC	chain of custody; contaminant of concern
COE	Corps of Engineers
Con	skin or eye contact
COPC	chemical(s) of potential concern
COPEC	chemical(s) of potential ecological concern
CPSS	chemicals present in site samples
CQCSM	Contract Quality Control System Manager
CRDL	contract-required detection limit
CRL	certified reporting limit
CRQL	contract-required quantitation limit
CRZ	contamination reduction zone
Cs-137	cesium-137
CS	ortho-chlorobenzylidene-malononitrile
CSEM	conceptual site exposure model
CSM	conceptual site model
CT	central tendency
ctr.	container
CWA	chemical warfare agent
CWM	chemical warfare material; clear, wide mouth
CX	dichloroformoxime
'D'	duplicate; dilution
D&I	detection and identification
DAAMS	depot area air monitoring system
DAF	dilution-attenuation factor
DANC	decontamination agent, non-corrosive
°C	degrees Celsius
°F	degrees Fahrenheit
DCA	dichloroethane
DCE	dichloroethene
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethene
DDT	dichlorodiphenyltrichloroethane
DEH	Directorate of Engineering and Housing
DEP	depositional soil
DFTPP	decafluorotriphenylphosphine
DI	deionized
DID	data item description
DIMP	di-isopropylmethylphosphonate
DM	dry matter; adamsite

DMBA	dimethylbenz(a)anthracene
DMMP	dimethylmethylphosphonate
DOD	U.S. Department of Defense
DOJ	U.S. Department of Justice
DOT	U.S. Department of Transportation
DP	direct-push
DPDO	Defense Property Disposal Office
DPT	direct-push technology
DQO	data quality objective
DRMO	Defense Reutilization and Marketing Office
DRO	diesel range organics
DS	deep (subsurface) soil
DS2	Decontamination Solution Number 2
DWEL	drinking water equivalent level
E&E	Ecology and Environment, Inc.
EB	equipment blank
EBS	environmental baseline survey
EC_{50}	effects concentration for 50 percent of a population
ECBC	Edgewood Chemical/Biological Command
ED	exposure duration
EDD	electronic data deliverable
EF	exposure frequency
EDQL	ecological data quality level
EE/CA	engineering evaluation and cost analysis
Elev.	elevation
EM	electromagnetic
EMI	Environmental Management Inc.
EM31	Geonics Limited EM31 Terrain Conductivity Meter
EM61	Geonics Limited EM61 High-Resolution Metal Detector
EOD	explosive ordnance disposal
EODT	explosive ordnance disposal team
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
EPIC	Environmental Photographic Interpretation Center
EPRI	Electrical Power Research Institute
ER	equipment rinsate
ERA	ecological risk assessment
ER-L	effects range-low
ER-M	effects range-medium
ESE	Environmental Science and Engineering, Inc.
ESMP	Endangered Species Management Plan
ESN	Environmental Services Network, Inc.
ESV	ecological screening value
ET	exposure time
EU	exposure unit
Exp.	explosives
E-W	east to west
EZ	exclusion zone
FAR	Federal Acquisition Regulations
FB	field blank
FD	field duplicate
FDA	U.S. Food and Drug Administration
FedEx	Federal Express, Inc.
FEMA	Federal Emergency Management Agency
FFCA	Federal Facilities Compliance Act
FFE	field flame expedient
FFS	focused feasibility study
FI	fraction of exposure
Fil	filtered
Flt	filtered
FMDC	Fort McClellan Development Commission
FML	flexible membrane liner
FMP 1300	Former Motor Pool 1300
FOMRA	Former Ordnance Motor Repair Area
Foster Wheeler	Foster Wheeler Environmental Corporation
Frtn	fraction
FS	field split; feasibility study
FSP	field sampling plan
ft	feet
ft/ft	feet per foot
FTA	Fire Training Area
FTMC	Fort McClellan
FTRRA	FTMC Reuse & Redevelopment Authority
g	gram
g/m^3	gram per cubic meter
G-856	Geometrics, Inc. G-856 magnetometer
G-858G	Geometrics, Inc. G-858G magnetic gradiometer
GAF	gastrointestinal absorption factor
gal	gallon
gal/min	gallons per minute
GB	sarin
gc	clay gravels; gravel-sand-clay mixtures
GC	gas chromatograph
GCL	geosynthetic clay liner
GC/MS	gas chromatograph/mass spectrometer
GCR	geosynthetic clay liner
GFAA	graphite furnace atomic absorption
GIS	Geographic Information System
gm	silty gravels; gravel-sand-silt mixtures
gp	poorly graded gravels; gravel-sand mixtures
gpm	gallons per minute
GPR	ground-penetrating radar
GPS	global positioning system
GS	ground scar
GSA	General Services Administration; Geologic Survey of Alabama
GSBP	Ground Scar Boiler Plant
GSSI	Geophysical Survey Systems, Inc.
GST	ground stain
GW	groundwater
gw	well-graded gravels; gravel-sand mixtures
HA	hand auger
HCl	hydrochloric acid
HD	distilled mustard
HDPE	high-density polyethylene
HEAST	Health Effects Assessment Summary Tables
Herb.	herbicides
HHRA	human health risk assessment
HI	hazard index
HPLC	high performance liquid chromatography
HNO_3	nitric acid
HQ	hazard quotient
HQ_{screen}	screening-level hazard quotient
hr	hour
H&S	health and safety
HSA	hollow-stem auger
HTRW	hazardous, toxic, and radioactive waste
'I'	out of control, data rejected due to low recovery
IATA	International Air Transport Authority
ICAL	initial calibration
ICB	initial calibration blank
ICP	inductively-coupled plasma
ICRP	International Commission on Radiological Protection
ICS	interference check sample
ID	inside diameter
IDL	instrument detection limit
IDLH	immediately dangerous to life or health
IDM	investigative-derived media
IDW	investigation-derived waste
IEUBK	Integrated Exposure Uptake Biokinetic
IF	ingestion factor; inhalation factor
ILCR	incremental lifetime cancer risk
IMPA	isopropylmethyl phosphonic acid
IMR	Iron Mountain Road
in.	inch
Ing	ingestion
Inh	inhalation
IP	ionization potential
IPS	International Pipe Standard
IR	ingestion rate
IRDMIS	Installation Restoration Data Management Information System
IRIS	Integrated Risk Information Service
IRP	Installation Restoration Program
IS	internal standard
ISCP	Installation Spill Contingency Plan

List of Abbreviations and Acronyms *(Continued)*

IT	IT Corporation
ITEMS	IT Environmental Management System™
'J'	estimated concentration
JeB2	Jefferson gravelly fine sandy loam, 2 to 6 percent slopes, eroded
JeC2	Jefferson gravelly fine sandy loam, 6 to 10 percent slopes, eroded
JfB	Jefferson stony fine sandy loam, 0 to 10 percent slopes have strong slopes
JPA	Joint Powers Authority
K	conductivity
K_{ow}	octonal-water partition coefficient
L	lewisite; liter
l	liter
LBP	lead-based paint
LC	liquid chromatography
LCS	laboratory control sample
LC_{50}	lethal concentration for 50 percent population tested
LD_{50}	lethal dose for 50 percent population tested
LEL	lower explosive limit
LOAEL	lowest-observed-advserse-effects-level
LT	less than the certified reporting limit
LUC	land-use control
LUCAP	land-use control assurance plan
LUCIP	land-use control implementation plan
max	maximum
MB	method blank
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
MCPA	4-chloro-2-methylphenoxyacetic acid
MCS	media cleanup standard
MD	matrix duplicate
MDC	maximum detected concentration
MDCC	maximum detected constituent concentration
MDL	method detection limit
mg	milligrams
mg/kg	milligrams per kilogram
mg/kg/day	milligram per kilogram per day
mg/kgbw/day	milligrams per kilogram of body weight per day
mg/L	milligrams per liter
mg/m^3	milligrams per cubic meter
mh	inorganic silts, micaceous or diatomaceous fine, sandy or silt soils
MHz	megahertz
µg/g	micrograms per gram
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
µmhos/cm	micromhos per centimeter
min	minimum
MINICAMS	miniature continuous air monitoring system
ml	inorganic silts and very fine sands
mL	milliliter
mm	millimeter
MM	mounded material
MMBtu/hr	million Btu per hour
MOGAS	motor vehicle gasoline
MP	Military Police
MPA	methyl phosphonic acid
MPM	most probable munition
MQL	method quantitation limit
MR	molasses residue
MRL	method reporting limit
MS	matrix spike
mS/cm	millisiemens per centimeter
mS/m	millisiemens per meter
MSD	matrix spike duplicate
MTBE	methyl tertiary butyl ether
msl	mean sea level
MtD3	Montevallo shaly, silty clay loam, 10 to 40 percent slopes , severely eroded
mV	millivolts
MW	monitoring well
MWI&P	Monitoring Well Installation and Management Plan
Na	sodium
NA	not applicable; not available
NAD	North American Datum
NAD83	North American Datum of 1983
NAVD88	North American Vertical Datum of 1988
NAS	National Academy of Sciences
NCEA	National Center for Environmental Assessment
NCP	National Contingency Plan
NCRP	National Council on Radiation Protection and Measurements
ND	not detected
NE	no evidence; northeast
ne	not evaluated
NEW	net explosive weight
NFA	No Further Action
NG	National Guard
NGP	National Guardsperson
ng/L	nanograms per liter
NGVD	National Geodetic Vertical Datum
Ni	nickel
NIC	notice of intended change
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Standards and Technology
NLM	National Library of Medicine
NPDES	National Pollutant Discharge Elimination System
NPW	net present worth
No.	number
NOAA	National Oceanic and Atmospheric Administration
NOAEL	no-observed-adverse-effects-level
NR	not requested; not recorded; no risk
NRC	National Research Council
NRCC	National Research Council of Canada
NRHP	National Register of Historic Places
ns	nanosecond
N-S	north to south
NS	not surveyed
NSA	New South Associates, Inc.
nT	nanotesla
nT/m	nanoteslas per meter
NTU	nephelometric turbidity unit
nv	not validated
O_2	oxygen
O&G	oil and grease
O&M	operation and maintenance
OB/OD	open burning/open detonation
OD	outside diameter
OE	ordnance and explosives
oh	organic clays of medium to high plasticity
ol	organic silts and organic silty clays of low plasticity
OP	organophosphorus
ORP	oxidation-reduction potential
OSHA	Occupational Safety and Health Administration
OSWER	Office of Solid Waste and Emergency Response
OVM-PID/FID	organic vapor meter-photoionization detector/flame ionization detector
OWS	oil/water separator
oz	ounce
PA	preliminary assessment
PAH	polynuclear aromatic hydrocarbon
PARCCS	precision, accuracy, representativeness, comparability, completeness, and sensitivity
Parsons	Parsons Engineering Science, Inc.
Pb	lead
PBMS	performance-based measurement system
PC	permeability coefficient
PCB	polychlorinated biphenyl
PCDD	polychlorinated dibenzo-p-dioxins
PCDF	polychlorinated dibenzofurans
PCE	perchloroethene
PCP	pentachlorophenol
PDS	Personnel Decontamination Station
PEF	particulate emission factor
PEL	permissible exposure limit
PERA	preliminary ecological risk assessment
PES	potential explosive site
Pest.	pesticides
PETN	pentarey thritol tetranitrate
PFT	portable flamethrower

List of Abbreviations and Acronyms (Continued)

PG	professional geologist
PID	photoionization detector
PkA	Philo and Stendal soils local alluvium, 0 to 2 percent slopes
PM	project manager
POC	point of contact
POL	petroleum, oils, and lubricants
POW	prisoner of war
PP	peristaltic pump; Proposed Plan
ppb	parts per billion
PPE	personal protective equipment
ppm	parts per million
PPMP	Print Plant Motor Pool
ppt	parts per thousand
PR	potential risk
PRA	preliminary risk assessment
PRG	preliminary remediation goal
PS	chloropicrin
PSSC	potential site-specific chemical
pt	peat or other highly organic silts
PVC	polyvinyl chloride
QA	quality assurance
QA/QC	quality assurance/quality control
QAM	quality assurance manual
QAO	quality assurance officer
QAP	installation-wide quality assurance plan
QC	quality control
QST	QST Environmental, Inc.
qty	quantity
Qual	qualifier
'R'	rejected data; resample
R&A	relevant and appropriate
RA	remedial action
RAO	removal action objective
RBC	risk-based concentration
RCRA	Resource Conservation and Recovery Act
RD	remedial design
RDX	cyclonite
ReB3	Rarden silty clay loams
REG	regular field sample
REL	recommended exposure limit
RFA	request for analysis
RfC	reference concentration
RfD	reference dose
RGO	remedial goal option
RI	remedial investigation
RL	reporting limit
RME	reasonable maximum exposure
ROD	Record of Decision
RPD	relative percent difference
RRF	relative response factor
RSD	relative standard deviation
RTC	Recruiting Training Center
RTECS	Registry of Toxic Effects of Chemical Substances
RTK	real-time kinematic
SA	exposed skin surface area
SAD	South Atlantic Division
SAE	Society of Automotive Engineers
SAIC	Science Applications International Corporation
SAP	installation-wide sampling and analysis plan
sc	clayey sands; sand-clay mixtures
Sch.	Schedule
SCM	site conceptual model
SD	sediment
SDG	sample delivery group
SDZ	safe distance zone; surface danger zone
SEMS	Southern Environmental Management & Specialties, Inc.
SF	cancer slope factor
SFSP	site-specific field sampling plan
SGF	standard grade fuels
SHP	installation-wide safety and health plan
SI	site investigation
SINA	Special Interest Natural Area
SL	standing liquid
SLERA	screening-level ecological risk assessment
sm	silty sands; sand-silt mixtures
SM	Serratia marcescens
SMDP	Scientific Management Decision Point
s/n	signal-to-noise ratio
SOP	standard operating procedure
SOPQAM	U.S. EPA's *Standard Operating Procedure/Quality Assurance Manual*
sp	poorly graded sands; gravelly sands
SP	submersible pump
SPCC	system performance calibration compound
SPCS	State Plane Coordinate System
SPM	sample planning module
SQRT	screening quick reference tables
Sr-90	strontium-90
SRA	streamlined human health risk assessment
SRM	standard reference material
Ss	stony rough land, sandstone series
SS	surface soil
SSC	site-specific chemical
SSHO	site safety and health officer
SSHP	site-specific safety and health plan
SSL	soil screening level
SSSL	site-specific screening level
SSSSL	site-specific soil screening level
STB	supertropical bleach
STC	source-term concentration
STD	standard deviation
STEL	short-term exposure limit
STL	Severn-Trent Laboratories
STOLS	Surface Towed Ordnance Locator System®
Std. units	standard units
SU	standard unit
SUXOS	senior UXO supervisor
SVOC	semivolatile organic compound
SW	surface water
SW-846	U.S. EPA's *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*
SWMU	solid waste management unit
SWPP	storm water pollution prevention plan
SZ	support zone
TAL	target analyte list
TAT	turn around time
TB	trip blank
TBC	to be considered
TCA	trichloroethane
TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
TCDF	tetrachlorodibenzofurans
TCE	trichloroethene
TCL	target compound list
TCLP	toxicity characteristic leaching procedure
TDEC	Tennessee Department of Environment and Conservation
TDGCL	thiodiglycol
TDGCLA	thiodiglycol chloroacetic acid
TERC	Total Environmental Restoration Contract
THI	target hazard index
TIC	tentatively identified compound
TLV	threshold limit value
TN	Tennessee
TNT	trinitrotoluene
TOC	top of casing; total organic carbon
TPH	total petroleum hydrocarbons
TR	target cancer risk
TRADOC	U.S. Army Training and Doctrine Command
TRPH	total recoverable petroleum hydrocarbons
TSCA	Toxic Substances Control Act
TSDF	treatment, storage, and disposal facility
TWA	time-weighted average
UBR	upper background range
UCL	upper confidence limit
UCR	upper certified range
'U'	not detected above reporting limit

UF	uncertainty factor
USACE	U.S. Army Corps of Engineers
USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
USAEC	U.S. Army Environmental Center
USAEHA	U.S. Army Environmental Hygiene Agency
USACMLS	U.S. Army Chemical School
USAMPS	U.S. Army Military Police School
USATCES	U.S. Army Technical Center for Explosive Safety
USATEU	U.S. Army Technical Escort Unit
USATHAMA	U.S. Army Toxic and Hazardous Material Agency
USC	United States Code
USCS	Unified Soil Classification System
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
UTL	upper tolerance level; upper tolerance limit
UXO	unexploded ordnance
UXOQCS	UXO Quality Control Supervisor
UXOSO	UXO safety officer
V	vanadium
VOA	volatile organic analyte
VOC	volatile organic compound
VOH	volatile organic hydrocarbon
VQlfr	validation qualifier
VQual	validation qualifier
VX	nerve agent (O-ethyl-S-[diisopropylaminoethyl]-methylphosphonothiolate)
WAC	Women's Army Corps
Weston	Roy F. Weston, Inc.
WP	installation-wide work plan
WRS	Wilcoxon rank sum
WS	watershed
WSA	Watershed Screening Assessment
WWI	World War I
WWII	World War II
XRF	x-ray fluorescence
yd^3	cubic yards

ATTACHMENT 2

STANDARD OPERATING PROCEDURE FOR DRUM SAMPLING

IT STANDARD OPERATING PROJECT PROCEDURE

Fort McClellan, Anniston, Alabama

Subject: DRUM SAMPLING

1.0 PURPOSE

1.1 To provide general reference information for use in planning and implementing sampling programs that involve the moving, opening and sampling of closed containers (drums) at IT Corporation (IT) project sites.

1.2 To provide guidelines for primary and secondary staging of drums.

1.3 To provide IT standard procedures for opening containers.

1.4 To provide guidelines for the sampling of containerized materials.

1.5 To discuss site organization and assigned responsibilities.

1.6 To provide information on protective clothing, worker protection and other safety related issues.

2.0 SCOPE

2.1 This guideline is applicable to opening and sampling of closed containers (120 gallon or less) on IT project sites. Bulk tanks such as railroad tank cars, large above- and below-ground tanks (with a capacity of more than 120 gallons), and tank trailers are not considered in this procedure.

3.0 RELATED DOCUMENTS

3.1 Cassis, Jo, et al., 1985. Guidance Document for Cleanup of Surface Tank and Drum Sites. Prepared for Office of Emergency and Remedial Response, USEPA, Washington, D.C. under Contract No. 68-01-6930.

3.2 IT Corporation (IT), 1988. Hazardous Waste Operations and Emergency Response, December.

3.3 IT Corporation (IT), 2000. Final Installation-Wide Sampling and Analysis Plan, Fort McClellan, Calhoun County, March.

3.4 IT Corporation (IT), 1998. Final Installation-Wide Work Plan, Fort McClellan, Calhoun County, August.

3.3 Martin, F.M., Lippitt, J.M., Prothero, T.G., 1987. Hazardous Waste Handbook for Health and Safety, Butterworth Publishers, p. 167-177.

3.4 NIOSH, OSHA, USCG, & USEPA, October 1985. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities.

3.5 NUS Corporation, 1983. Operating Guidelines Manual.

3.6 IT Compatibility Testing Manual, 1993.

3.7 USEPA, 1986. Drum Handling Practices at Hazardous Waste Sites, EPA/600/2-86/013.

3.8 US Code of Federal Regulations 29 CFR 1910 and 1926 (OSHA).

3.9 US Code of Federal Regulations 49 CFR 265 (EPA).

4.0 GENERAL INFORMATION

4.1 Location of containers on a hazardous waste site.

4.1.1 Typically, waste is shipped to sites in 55-gallon drums on trucks. About 60 to 80 drums are delivered from a given load, depending on the weight of the load. Usually there is some type of pattern to the method that the drums were staged on site. Markings on the drums may assist in determination of these patterns. Frequently, the only indication that a group of drums is related will be the color, size, or type of drum. During the initial site inspection, one should look for distinguishing features in an attempt to define the different lots or patterns of drums on the site. Often the trade

name, chemical name, or empirical formula will be written on the drum. Another distinguishing feature would be drums of exotic metal such as aluminum, nickel, Monel, stainless steel, etc. A manufacturing facility will use a specified DOT coded drum, a strange drum size, or a drum with an unusual configuration or adaptation for a particular process line (center of drum head fill bung, double-sided fill/vent bungs, etc.).

4.1.2 At almost every site that has been receiving waste, there is an isolated group of containers. These containers were most likely segregated because of their reactive nature or containing highly hazardous materials. Approach these with care and try to determine why they were segregated.

4.1.3 In any lot of drums there is sometimes encountered an unusual or out-of-place container. This oddball container will not fit the pattern, color, size, etc., of those around it (e.g., it may be the only distended drum among undistended drums or a lined drum among unlined drums).

4.2 Strict adherence to safety precautions will occur during drum handling, opening and sampling. Site Health and Safety Plan and Site Unexploded Ordnance work plan procedures and requirements will supersede this document and will be adhered to during field activities on-site.

4.3 Risks

4.3.1 Four basic risks are involved in moving and opening closed containers:

4.3.1.1 Exposure of personnel to toxic materials

4.3.1.2 Fire

4.3.1.3 Explosion

4.3.1.4 Hazardous reactions (i.e. rapid polymerization reactions)

4.3.2 Exposure of personnel to toxic materials.

4.3.2.1 The first risk can be reasonably eliminated through the use of proper skin and respiratory protection equipment. The use of level B protection with splash guard (i.e. Tyvek and Saran suits with face shield) acceptably reduces the risk of a worker being injured by toxic vapors, mists, or splashes.

4.3.3 Fire

4.3.3.1 In the same way, standard fire prevention procedures can be used to reduce the fire hazard through the use of detector instruments and proper equipment. These include the use of non-sparking tools and intrinsically safe radios, pumps, and other equipment as well as the staging of fire fighting equipment and the elimination of any other possible ignition sources. Piles of sand and lime (for neutralization and suffocation) will be on hand at the site in case of a fire.

4.3.4 Explosion

4.3.4.1 The explosive risk however, is not as easily handled, and thus is the primary consideration in any container-opening operation. Even if no solid evidence of the presence of explosives is found during the preliminary data collection, one can never be certain that explosives have not been disposed of at the site. In order to provide the same reasonable level of protection against this risk as against toxic exposure and fire, a very cautious approach, such as the one recommended in this guideline, should be used (see section 7.6.2, Drums Containing Explosive or Shock Sensitive Waste).

4.3.5 Hazardous Reactions

4.3.5.1 The risk of a hazardous reaction is another primary consideration in any container opening operation. Since a reaction can be triggered by a wide range of possibilities, it is not something that is always preventable. In order to provide the same reasonable level of protection against this risk as against toxic exposure and hazardous reactions, a very cautious approach should be used. An example of a hazardous reaction would be the self-polymerization of nylon or styrene precursors. Both can generate heat, fumes and can explosively pressurize a drum.

4.4 Scenarios involving drums encountered in the field may include drums that are:

- Unmarked
- Mislabeled
- Bulging (pressurized)
- Buried
- Deteriorated (physically unsound)
- Leaking

4.4.1 Drum condition and contents will be the factors which will determine the general drum handling and sampling procedures.

4.5 Consult OSHA regulations (29 CFR Sections 1910 and 1926) for established general requirements and standards for storing, containing, and handling chemicals and containers, and for maintaining equipment used for handling materials.

4.6 Consult EPA regulations (49 CFR 265) for requirements pertaining to the types of containers, maintenance of containers and containment structures, and design and maintenance of storage areas.

5.0 DEFINITIONS

5.1 Air Reactive Wastes - Some chemicals, such as white phosphorus and some of the metallic hydrides, react with the oxygen in the air and can start burning or at least producing considerable amounts of heat and may possibly release toxic or flammable vapors.

5.2 Compatibility Testing - A series of tests performed on individual drum samples where the object of the testing is to find those drums which have similar and potentially compatible contents. After further testing the contents of these drums would be mixed together to form a larger single waste stream for disposal purposes.

5.3 Container - Defined as any drum, bottle, can, bag, etc., with a capacity of 120 gallons (450 liters) or less.

5.3 Dosimeter - A portable, transistorized survey meter that can be used for radiation monitoring purposes and/or contamination measurements.

5.4 Exotic Metal Drums - (i.e. aluminum, nickel, stainless steel, or other unusual metals). Very expensive drums that usually contain an extremely dangerous material.

5.5 Glass Thief - A glass tube 4 feet long and 3/4 inches in diameter, used for taking samples from drums. The tube is usually broken up and disposed of in the drum following sampling.

5.6 LEL - (Lower explosive limit.) An air monitoring device can test the surrounding air for sufficient oxygen content for life support and/or the presence of combustible gases or vapors which may pose a potential flammability hazard. The lower explosive limit is defined as the minimum concentration of a particular combustible gas in the air that can be ignited. The upper explosive limit is defined as the maximum concentration that can be ignited.

5.7 Laboratory Packs - Such drums are commonly used for disposal of expired chemicals and process samples from laboratories, hospitals and similar institutions. Bottles in the laboratory pack may contain incompatible materials and may not be packed in absorbent material. They may contain radioisotopes, shock sensitive, highly volatile, highly corrosive, or very toxic exotic chemicals. Laboratory packs have been the primary ignition sources for fires at some hazardous waste sites.

5.8 Monitox - A portable warning device used for detecting specific toxic gases found in the surrounding air (i.e. H_2S, HCl, Cl, HCN and $COCl_2$).

5.9 PID - (photoionization detector) A portable air-monitoring instrument used to detect organic vapors. The PID does not distinguish between different types of vapors or tell if more than one vapor is present.

5.10 Polyethylene or PVC-lined Drums - Often contains strong acids or bases. If the lining is punctured, the substance usually corrodes the steel, resulting in a significant leak or spill.

5.11 Shock Sensitives - A chemical which may undergo a very rapid chemical transformation, with the simultaneous production of large quantities of heat and gases, if introduced to shock (i.e. friction).

5.12 Single-Walled Drums Used as a Pressure Vessel - These drums have fittings for both product filling and placement of an inert gas, such as nitrogen. Such drums may contain reactive, flammable, or explosive substances.

5.13 Vapor Control - The use of an LEL, PID, Monitox, or any other air monitoring device to assure the quality of air meets all safety requirements.

5.14 Waste Blending Test - A waste blending test is done on sample materials from drums that were found to be similar and potentially compatible with each other. The sample materials are proportionally and sequentially blended with each other and observations and measurements are made during and after the blending process to determine if any potentially hazardous reactions are occurring (i.e., temperature rise, outgassing occurring or other reaction).

5.14 Water Reactive Wastes - Some chemicals will react violently with water on contact or through contact with moisture in the air while others may give off toxic or flammable gasses. Sodium or potassium metal reacts violently with water while calcium carbide reacts to produce a flammable gas (acetylene).

6.0 RESPONSIBILITIES

6.1 Site Manager

6.1.1 The Site manager will:

6.1.1.1 Act as site coordinator for field technical personnel

6.1.1.2 Review and update site sampling and analytical plans as required.

6.1.1.3 Determine which procedures and methods will be utilized on- site.

6.2 Project Chemist

6.2.1 The project Chemist will:

6.2.1.1 Manage the mobile laboratory (if applicable) or the shift so that the data generated meets the required levels of certification

6.2.1.2 Implement sample acquisition numbering system.

6.3 Chemists

6.3.1 The chemists will:

6.3.1.1 Carry out compatibility tests (if applicable)

6.3.1.2 Carry out approved analytical procedures and maintain sample analysis tracking forms.

6.4 Sample Technicians

6.4.1 The sampling technicians will be responsible for:

6.4.1.1 Carrying out all drum sampling as per the Installation-Wide Sampling and Analysis Plan (IT, 2000) and SOP

6.4.1.2 Generate trip blanks, equipment blanks, and acquire replicate samples as per the Installation-Wide Sampling and Analysis Plan (IT, 2000)

6.4.1.3 Record all field data in Log Books or on drum logs forms

6.4.1.4 Fill out COC forms.

6.5 Procedure Modifications

6.5.1 The responsibility and authority for modifying this SOP (Fort McClellan Drum Sampling) lies with the Fort McClellan Project Manager and Technical Leads.

7.0 PROCEDURE

7.1 Introduction

7.1.1 The guidance presented is based on field experience in working with containers on uncontrolled hazardous substance sites and on information contained in USEPA and other government agency publications. It will be evident that in many cases hard and fast rules cannot be given, and profes-

sional judgement is required because uncontrolled variables are involved. For example, no one can be absolutely certain of any assessment of the potential contents of a container. Labels cannot be absolutely trusted; only educated guesses can be made by a thorough review of all available background data, such as potential sources of the wastes. The following topics will be covered in the paragraphs to follow:

7.1.1.1 Initial inspection of drums.

7.1.1.2 Handling.

7.1.1.3 Staging.

7.1.1.4 Remote opening of drums.

7.1.1.5 Second inspection of drums.

7.1.1.6 Numbering and mapping of drums.

7.1.1.7 Sampling of drums.

7.1.1.8 Characterization and test blending.

7.1.2 During many drum projects, several phases will be in progress simultaneously. Air monitoring, dust control, and organic vapor control operations should be in progress throughout the course of the project.

7.2 Initial Inspection

7.2.1 Prior to physically handling a drum or other container, the following preliminary classification checklist must be reviewed by a chemist and each response noted in a field notebook:

7.2.1.1 Are the drums radioactive?

7.2.1.2 Do the drums exhibit leakage or deterioration, i.e., is it unsound?

7.2.1.3 Do the drums exhibit apparent internal pressure?

7.2.1.4 Do the drums contain markings which would indicate that the contents are potentially explosive?

7.2.1.5 Are the drums of special construction (i.e., Nickel, Stainless Steel, or Corrugated drums)?

7.2.2 Drums which are determined to be possibly radioactive, shock sensitive, or reactive will be segregated to a special handling area. The results of the preliminary classification checklist will dictate what procedures are followed in the handling, opening, and sampling of a drum.

7.2.2.1 Overpacking Leakers

7.2.2.1.1 During the initial inspection, and beyond, personnel should watch for leaking drums. These must be overpacked promptly, and the spill should be cleaned up immediately.

7.2.3 Gas Cylinders

7.2.3.1 Gas cylinders, when encountered, should be stored and disposed of on a special case by case basis depending on the integrity of the cylinders and the type of substance they may contain.

7.2.4 Air Monitoring

7.2.4.1 Preliminary surveys at project sites for organic vapors, explosivity, and radiation should be completed for all drum projects. This survey will aid in identifying site specific hazards and development of work zones. In addition, this is how many of the drums that require special handling are identified.

7.2.4.2 Radiological Survey

7.2.4.2.1 The personnel conducting radiological surveys will have a basic knowledge of the radiological survey meter used and of radiation types.

7.2.4.2.2 There are three types of radiation which might be encountered in the field:

Alpha (α), which is stopped by clothing or a sheet of paper. While alpha radiation is the least penetrating type, it can be very dangerous if alpha-emitting radionuclides are ingested, inhaled, or enter the body through a puncture wound.

Beta (β), which is stopped by the steel wall of a drum.

Gamma (γ) or X-ray, which is only stopped by lead shielding, thick concrete, or steel.

7.2.4.2.3 Ionizing Radiation Survey Meters

The survey meters IT uses measure radiation in units of millirems per hour (mr/hr). The dose that one is exposed to is calculated by multiplying the hours of exposure by the average measured level of exposure as determined by a calibrated radiation meter. The specified survey meter as found in the equipment list in Section 8.0 has internally mounted twin detectors. The survey meter shall be checked for proper function by use of a low-level non-regulated source before each day's usage of the meter. Record the results of the meter check in the sampler's daily notes.

7.2.4.2.4 Background Level for Gamma Radiation

The background level for gamma radiation is between 0.008 and 0.02 mr/hr. Occasionally, the needle will briefly jump above this level, but it should not stay there.

7.2.4.2.5 Radiation Areas Defined

The Nuclear Regulatory Commission defines a radiation area to be one in which the radiation levels are at 5 mr/hr or greater or an area where one can accumulate 100 milli

rems of exposure in 5 days of normal work in the area. A high-radiation area has radiation at levels greater than 100 mr/hr.

When abnormally high readings are obtained, ranging from 0.2 to 2.0 mr/hr, one must first ascertain that this is not caused by a malfunction in the unit. If the readings are not caused by a malfunction one should follow the guidelines in Table 7.2-1 below.

Table 7.2-1
Dosimeter Readings

Reading	Action
< or = 2 mrem/hr	Radiation above background levels (0.01-0.02 mrem/hr) signifies the possible presence of radiation sources. Continue investigation with caution.
> 2 mrem/hr	Potential radiation hazard. Contact Site Health and Safety Officer and Site Supervisor immediately.

7.2.4.3 Other air monitoring includes scans with a Photoionization Detector (PID), Lower Explosion Limit (LEL) meter, and cyanide and sulfide monitoxes. Since the majority (if not all) of the drums should be unopened at the time of the initial survey, this scan is typically performed over the tops of the sealed drums. Special Handling drums are sometimes identified during this scan when PID or LEL readings are abnormally high or when cyanide and/or sulfide monitox alarms sound. Such drums will need to be segregated to a special handling area.

7.3 The handling, movements and transport of drums and other containers should be by use of mechanical equipment only; no drums should be handled manually. Remote drum handling equipment may consist of a grappler-equipped backhoe or front-end loader. Drum transportation should be with front-end loaders or forklifts with modified carrying platforms. Portions of equipment that contact drums or canisters should be constructed of non-ferrous metals or contact portions should be coated or lined to preclude spark generation. Handling and transport equipment must be equipped with full frontal and side splash and explosion shields. Class ABC fire extinguishers will be fitted to the body of each piece of equipment.

7.3.1 Personnel involved in handling and transporting containerized waste will work in teams containing no fewer than two people. Visual contact will be maintained between members of the working team at all times. All team members will be able to communicate between themselves and with the Site Health and Safety Officer by intrinsically safe two-way radios at all times on the work site.

7.3.2 Whenever possible, drums or other containers to be sampled should be opened and sampled in place to minimize handling. However, when drums are stacked or are close together, they may have to be moved to prevent sympathetic detonation of or chemical reaction with, other drums around the one being opened. The main criterion is distance to other drums -a reasonable distance should be maintained to keep the drum to be opened segregated from the others.

7.3.3 Leaking or Deteriorated Drums

7.3.3.1 The contents of drums that exhibit leakage or apparent deterioration such that movement will cause rupture (determined by the Health and Safety Officer) must immediately be transferred to a repack drum. Equipment, including transfer pumps used in the repack operation must be of explosion-proof construction.

7.3.3.2 Leaking drums containing sludges or semi-solids, drums that are structurally sound but which are open and contain liquid or solid waste, and drums which are deteriorated but can be moved without rupture must be placed in overpack containers. Make certain that representative

samples are obtained from overpacked drums. Sample the actual drum, not material that has leaked from the drum into the overpack.

7.3.4 Bulging Drums

7.3.4.1 Drums which potentially may be under internal pressure, as evidenced by bulging, must be sampled in place. Extreme care shall be exercised when working with and adjacent to potentially pressurized drums.

7.3.4.2 Should movement of a pressurized drum be unavoidable, handle only by a grappler unit constructed for explosive containment. The bulging drum should be moved only as far as necessary to allow seating on firm ground or it should be carefully overpacked.

7.4 Primary Staging of Drums

7.4.1 A staging configuration must allow the samplers reasonable access to each drum for inspection, sampling, and overpacking, if necessary, while economizing on space. Drums are staged in rows, two wide, with isle space between rows. According to the Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, "In all staging areas, stage the drums two wide in two rows, per area, and space these rows 7 to 8 feet apart to enable movement of the drum handling equipment."

7.5 Drum Opening

7.5.1 Drum opening operations are completed by remote means prior to the collection of samples. This provides the sampler a means for collecting a sample in an otherwise sealed container.

7.5.2 Opening Area

7.5.2.1 The drum opening area should be physically separated from the drum removal and drum staging operations. However, when drums must be opened after they are already in a staging area, personnel should be a minimum of 50 feet from the drum opening area. When drum opening can be performed at an area other than the staging area, there should be adequate distance between the drum opening and the removal and staging

operations to prevent a chain reaction or fire during the drum opening procedure.

7.5.3 Caterpillar 215 Grappler

7.5.3.1 Drum opening is normally accomplished with a Caterpillar 215 grappler using a brass-tipped punch. A remote drum-punching unit may also be used on smaller drum projects. At all times the staging area should be clear of personnel on the ground during punching operations. Extreme caution should always be taken when drum punching/opening is being performed. **AT NO TIME SHOULD DRUMS BE PUNCHED MANUALLY BY HAND USING HAND HELD TOOLS!** Drums that have been placed inside overpack drums upside down will need to be punched to obtain sample(s) of both liquids in them and any settled solids.

7.5.4 IT procedures prohibit the opening of drums containing unknown materials by hand. Employees found to be opening drums by hand will face disciplinary action. The drums will be opened by using a remote air operated punch or by the method described above.

7.5.5 Small containers, like drums, are not to be opened by hand at any time. IT has remote opening devices specifically designed for the opening of small containers.

7.5.6 Containers that are inside warehouses, basements, or other buildings should be moved outside before they are opened. Opening and sampling of containers inside a building should only be done when there are no areas outside of the building that could be safely or physically used for these purposes.

7.5.6.1 If it is determined that opening and sampling of containers must be done inside of a building, then the following minimum requirements must be met:

7.5.6.1.1 Adequate ventilation must be provided.

7.5.6.1.2 Containment must be in place around drum opening and sampling area.

7.5.6.1.3 A,B,C type fire extinguishers must be in place.

7.5.6.1.4 Sand and mechanized equipment for spreading the sand in case of a fire or reaction must be present when drum opening operations take place.

7.5.6.2 Consult the site-specific safety and health plan for this investigation. Additional information may be found in the Installation-Wide Sampling and Analysis Plan, Volume II – Installation-Wide Safety and Health Plan (IT, 2000).

7.6 Second Inspection

7.6.1 After the drums have been staged and opened, a second inspection of the drums is required. During the initial inspection, the drums would have been sealed and only inspection of the outside of the drums was possible. Since the drums are now open, visual observations of the drum contents will aid in locating drums that will require special handling.

7.6.2 Special handling techniques are required for containers that may expose personnel to particularly hazardous conditions. These techniques and techniques for recognition of special handling drums are described in general below, although site-specific conditions may require the development of specialized methods for handling of special handling drums. The following are considered to be problem containers:

7.6.2.1 Drums Containing Biohazards.

7.6.2.2 Drums Containing Explosive or Shock Sensitive Waste.

7.6.2.3 Drums Containing Radioactive Waste.

7.6.2.4 Packaged Laboratory Wastes (Laboratory Packs).

7.6.2.5 Air Reactive Wastes (in drums).

7.6.3 Drums Containing Biohazards.

7.6.3.1 A biohazard is defined by the Biohazards Committee of the American Industrial Hygiene Association (AIHA), as "an agent that is biological in nature, capable of self-reproduction, and has the capacity to produce deleterious effects upon other biological organisms, particularly humans." Biological agents or substances which could be biohazardous substances are but not limited to the following:

7.6.3.1.1 Infectious or parasitic agents.

7.6.3.1.2 Non-infectious microorganisms (such as some fungi, yeasts and algae).

7.6.3.1.3 Plants and plant products.

7.6.3.1.4 Animals and animal products which can cause occupational disease.

7.6.3.2 Recognition is the key to avoiding disease contaminated biological waste. Be aware that this may take the form of cultured animal cells, infected clinical specimens (tissues, fluids, etc.) or tissues from experimental animals (including animal dander). Open drums should be examined for evidence of biological material such as:

7.6.3.2.1 Gauze.

7.6.3.2.2 Hypodermic syringes.

7.6.3.2.3 Petri dishes.

7.6.3.2.4 Cultures.

7.6.3.2.5 Blood.

7.6.3.2.6 Animal tissues.

7.6.3.2.7 Waste from orthopedic casts (may be gray, crumbly solids resembling a type of insulation).

7.6.3.3 Biological waste that has been prepared for incineration or for autoclaving may be packaged in **red plastic bags** or may be contained in plastic bags that are marked with the universal biohazard symbol (one ring with three interlocking "C"-shaped rings on top). Biohazards such as research bacterial cultures may be sent through the mail if they are packaged in a mailing tube. It is conceivable that either type of packaging could be found on a hazardous waste project.

7.6.3.4 If a biohazard or possible biohazard is identified, seal the drum and immediately notify the Site Health and Safety Officer and the Site Manager.

7.6.4 Drums Containing Explosive or Shock Sensitive Waste

7.6.4.1 If drums containing wastes that have been identified by sampling, or are suspected by visual examination to be explosive in nature are found, the Site Manager and the Health and Safety Officer must be notified immediately, before the drums are handled in any way.

7.6.4.2 If the Site Manager and the Health and Safety Officer approve handling of these drums, they shall be handled with extreme caution. Initial handling shall be by a grappler unit constructed for explosive containment. Drums shall be palletized prior to transport to a high hazard interim storage and disposal area.

7.6.4.3 If at any time during remedial activities, an explosive, pursuant to provisions of Title 18, U.S. Code, Chapter 40 (Importation, Manufacturer, Distribution, and Storage of Explosive Materials, 1975 Explosives List) is identified, it should be secured and the appropriate state and federal agencies notified.

7.6.4.4 Identification of an explosive substance during the course of a remedial action is usually based on the experience of the on-site personnel. Potentially explosive material usually may be identified by their physical characteristics such as texture, color density, etc. as well as the way they are packaged. Most explosives are solids. In some cases they are packaged in watertight containers to exclude water while in other cases they are packaged wet to preclude explosion.

7.6.4.5 Prior to handling or transporting drums containing explosive wastes, personnel working in the area shall be removed to a safe distance (as determined by the HSO). Continuous contact with the communication base shall be maintained until handling or transporting operations are complete. An audible siren signal system shall be used to signify the commencement and completion of explosive waste handling or transporting activities.

7.6.5 Drums Containing Radioactive Waste

7.6.5.1 After the containers are opened, another radiological survey will be conducted.

7.6.5.2 Handling and Transporting Radioactive Waste Drums

7.6.5.2.1 Drums containing radioactive wastes shall not be handled until radiation levels have been determined by a field survey which is recorded in a field notebook. The survey shall include background levels, direct gamma readings and laboratory analysis of drum surface wipe samples.

7.6.5.2.2 Depending on the level of radiation encountered, handling and transport may require special shielding devices to protect personnel. Following handling and transport, equipment used shall be surveyed by the HSO and decontaminated to background levels prior to recommencing work. Surveys shall also be made of the ground surface in the vicinity of original drum storage to identify potential soil contamination by spilled or leaked radioactive waste. Prior to recommencing work in the area, radioactive soil areas shall be isolated to prevent tracking of radioactive contaminants about the site, and workers who entered the area should have their gloves and boots surveyed for radiation.

7.6.6 Packaged Laboratory Wastes (Laboratory Packs)

7.6.6.1 If drums known or suspected of containing discarded laboratory chemicals, reagents or other potentially dangerous materials in small volume, or individual containers are found, the Site Manager is to be notified immediately, before the drums or containers are moved or opened.

7.6.6.2 Lab pack drums are easily identified by the presence of vermiculite or other absorbent type packaging material. If a drum contains such material, there is a good possibility that the drum is a lab pack drum. Further investigation may reveal that the drum also contains smaller containers inside such as:

7.6.6.2.1 Sample jars.

7.6.6.2.2 Metal shipping containers.

7.6.6.2.3 Specially sealed packages.

7.6.6.2.4 Sealed 5 gallon buckets.

7.6.6.3 If the Site Manager and the Health and Safety Officer approve the handling of these containers, they shall be handled with extreme caution. Until otherwise categorized, they shall be considered to be explosive or shock-sensitive wastes. Initial handling shall be by a grappler unit constructed for explosive containment. Drums shall be palletized and overpacked, if required, prior to transport to a staging area where sorting, identification, repacking and/or stabilization can be done.

7.6.6.4 Prior to handling or transporting Laboratory Packs from the existing drum area, personnel working in the immediate area shall be removed to a safe distance. Continuous contact with the communication base shall be maintained until handling or transporting operations are complete. An audible siren signal system, similar to that employed in conventional blasting operations will be used to signify the commencement and cessation of Laboratory Pack handling or transporting activities.

7.6.7 Air Reactive Wastes

7.6.7.1 If the presence of air reactive substance is verified or even suspected, the material should be immediately segregated and transported to a separate high hazard interim storage and disposal area.

7.6.7.2 Air reactive wastes may be discovered during opening or sampling operations. Air reactive substances are routinely packaged in special containers or packages that keep the material from making contact with the air. They may be stored under kerosene or some other liquid to minimize air contact. They may also be found in sealed ampoules, corrugated drums, stainless steel canisters, sealed aluminum containers or specially lined drums.

7.7 Numbering and Mapping

7.7.1 Accurate numbering is critical. Mistakes in numbering, such as missing numbers or double numbering, are minimized by numbering after primary staging. (It is highly recommended that drums are not numbered prior to staging.) To avoid problems, empty containers (not removed from the staging area prior to sampling) should be numbered and recorded on drum inventory logs as empty. **DRUM NUMBERING SHOULD BE STRICTLY NUMERICAL.**

7.7.2 Mistakes in numbering occur in most drum sampling projects. In large part mistakes made in numbering have very little consequence until samples have been submitted to the laboratory. It is for this reason that drum numbering and drum mapping must occur before samples are collected.

7.7.3 After the drums in the staging area have been numbered, a drum map is made. The drum map is reviewed for double numbers and missing numbers. Any double numbered drums or missing numbers are corrected in the staging area and on the drum map before any sampling is to be performed in the staging area.

7.8 Sampling

7.8.1 Collection of samples should occur only after the procedures of the previous subsections have been followed. Any container not meeting these requirements will not be sampled until these procedures have been followed.

For example: If a drum is discovered to not have access into it (not remotely opened), the drum will not be sampled and the senior sampling

technologist and the site supervisor will be notified. In this example, the procedures of the previous subsections were not met. Had those procedures been met, there would be access into the drum because the drum would have been remotely opened on a previous occasion. Until access can be made into the drum by remote means, the drum will not be sampled.

7.8.2 The following subsections describe collection of samples from drums that have been inspected, handled, staged, remotely opened, and inspected a second time prior to sampling.

7.8.3 Required Equipment (See also Section 8.0 for more detailed and specific data on the equipment and supplies required).

7.8.3.1 1 12-column book.

7.8.3.2 2 IT record books.

7.8.3.3 1 knife, beryllium copper.

7.8.3.4 1 bung wrench, Ampco metal.

7.8.3.5 1 screwdriver, beryllium copper.

7.8.3.6 1 scraper, beryllium copper.

7.8.3.7 2 pair Wizard cut-resistant glove liners.

7.8.3.8 2 1/2 inch drive ratchets, BeCu alloy.

7.8.3.9 2 15/16 sockets, BeCu alloy.

7.8.3.10 2 polyethylene squirt bottles.

7.8.3.11 U.S. EPA Level B personal protective equipment.

7.8.3.12 1 radiation survey meter.

7.8.3.13 1 H_2S monitox with gas generator.

7.8.3.14 1 HCN monitox with gas generator.

7.8.4 Expendables per Hundred Drums.

7.8.4.1 120 drum log sheets.

7.8.4.2 120* 8 oz. jars with Teflon liners.

7.8.4.3 200 tongue depressors.

7.8.4.4 120 11-mm dip tubes.

7.8.4.5 400 pair sample gloves.

7.8.4.6 5 mean streaks.

7.8.4.7 4 rolls paper towels

7.8.4.8 2 trash bags.

7.8.4.9 12 chain-of-custody forms.

7.8.4.10 1 Liter of Isopropanol (Pesticide Grade).

7.8.4.11 1 Liter of Hexane (Pesticide Grade).

* Varies according to sample volume requirements.

7.8.5 Sampling Procedures

(See sections 7.8.5.3 - 7.8.5.7 for additional information on sampling solids, semisolids and liquids).

7.8.5.1 All drums not in direct contact with ground surface and mechanical equipment should be grounded prior to the commencement of sampling. The reason for grounding of drums, which are not in direct contact with ground surface, is that a simple static electricity charge transferred to a drum that is not grounded, can cause an explosion or start a fire. A

grounding rod driven into the ground surface, which is attached to copper wire, which is attached to a metal or copper clip, which is clipped to the drum being sampled, is an acceptable method of grounding a drum.

7.8.5.2 Once the drum has been grounded, sampling of the drum can begin. The steps to be followed in sampling are as follows:

7.8.5.2.1 Remove the lid of the overpack container or remove the polyethylene sheeting from the top of the drum.

7.8.5.2.2 Record any markings, special drum conditions, and type of opening on the Drum Inventory Log.

7.8.5.2.3 Record the identifying number from the drum onto the Drum Inventory Log. Have a copy (reduced size if necessary) of the drum staging area map and double-check the drum number and location.

7.8.5.2.4 Use a PID (if weather permits) and an LEL meter to collect air monitoring readings from the drum. Record the results on the Drum Inventory Log.

7.8.5.2.5 Insert glass tubing almost to the bottom of the drum or until a solid layer is encountered. About one foot of tubing should extend above the drum.

7.8.5.2.6 Allow the waste in the drum to reach its natural level in the tube. Cap the top of the sampling tube using a thumb or fore-finger.

7.8.5.2.7 Carefully remove the capped tube from the drum and insert the uncapped end in the sample container. Release thumb or forefinger from tube and allow the glass thief to drain completely into the sample container.

7.8.5.2.8 Repeat steps 6 & 7 until the required sample volume has been collected.

7.8.5.2.9 Place the used sampling tube, along with paper towels or waste rags (used to wipe up any spills), into an empty metal barrel marked "sampling waste" for subsequent disposal.

7.8.5.2.10 Close the sample container cover tightly, wipe off with a paper towel and place a label on the sample container.

7.8.5.2.11 Replace the overpack lid or place a plastic cover over the drum/container.

7.8.5.2.12 Measure the sample for radioactivity and record results on the Drum Inventory Log.

7.8.5.2.13 Fill out Chain-of-Custody Record and carefully package samples (if applicable). The finished package will be padlocked or custody-sealed for shipment to the laboratory. The preferred procedure includes the use of a custody seal across filament tape that is wrapped around the package at least twice. The custody seal (paper, plastic, or metal) is folded over and stuck to itself so that the only access to the samples is by cutting the filament tape or breaking the seal to unwrap the tape. The seal is signed before the package is shipped.

7.8.5.2.14 Complete the appropriate shipping forms. Drum samples are always considered to be high-hazard samples.

7.8.5.3 Sampling Solids and Semisolids

7.8.5.3.1 Solids in drums are sampled by scooping the material up with the use of drum thief, stainless steel spoon, scoop, or tongue depressors. Sampling device must be compatible with drum contents. All reasonable efforts shall be made to obtain sample to a depth of 12 inches or refusal. It is sometimes necessary to sample the material with the use of a trier. This sampling device is often not used however, due to the substantial increase in time necessary to obtain the samples and because of the time required to decontaminate the trier. Tongue depressors will be disposed after each use. Nonexpendable sampling tools must be decontaminated between drums. Sometimes, the material must first be broken up

with a non-sparking hammer or hammer and chisel (NOTE: This is the **ONLY** time in which a sampler is allowed to have a hammer and chisel in their hands), or, for rubber-like solids, a piece may need to be cut off with a knife.

7.8.5.4 Sampling Solids Underneath Liquids

7.8.5.4.1 Sludges or solids underneath a liquid may be sampled by forcing the rigid tubing into it. If the sludge does not run out into the jar, shaking the tubing or tapping it against the side of the bottle may loosen the sample. If this fails, one may break the tubing and put the pieces that have the solid in them in the bottle.

7.8.5.4.2 When glass tubing is used for sampling, samplers must wear Whizard glove liners (stainless steel mesh glove liners designed to prevent cuts which could be caused by sharp objects such as broken glass tubing).

7.8.5.5 Materials between drum and overpack

7.8.5.5.1 In many drum sampling projects where drums have been overpacked, it is typical to find liquids or solids between the drum and the overpack it is contained in. Sometimes these materials have the same appearance and matrix as the material inside of the drum itself. Sometimes this material can be quite different than the material inside the drum itself.

7.8.5.5.2 Solids

Solids may appear in an overpack, between the drum and the overpack that is different than the solids or liquids in the drum itself. If these solids appear to be soil, then a notation must be made on the Drum Inventory Log that the material exists between the drum and the overpack. This material does not need to be sampled. If these solids appear to be something other than soil, then this material must be sampled in accordance with Sampling Solids and Semisolids in section 7.8.3.1. In addition, a notation that the material

exists between the drum and the overpack must be made on the Drum Inventory Log.

7.8.5.5.3 Liquids

Liquids may appear in an overpack, between the drum and the overpack, which is different than the solids or liquids in the drum itself. This material must be sampled in accordance with Sampling Procedures in section 7.8.3. In addition, a notation that the material exists between the drum and the overpack must be made on the Drum Inventory Log.

7.8.5.6 Sampling Frozen Drums

7.8.5.6.1 IT is often faced with the need to collect samples in conditions where the temperature is below 32°F (0°C) and the material inside the drum is partially or completely frozen. In situations where the material in the drum is frozen, a Milwaukee wood bit with an air driven drill or hand drill can be used. An air driven drill or hand drill is used (with the Milwaukee wood bit) to drill, or auger through the frozen material. Every few inches of augering, the bit is removed and the shavings are placed into the appropriate sample container(s). This procedure is repeated until a sufficient volume of the material has been obtained. Care must be taken to ensure that a hole is not drilled through the bottom of the drum.

7.8.6 Post Sampling Procedures

7.8.6.1 After the sample has been taken, the outside of the bottle will be wiped off and labeled with the drum number. The drum number will also be written on the lid of the bottle. All sampling data and observations will be recorded on the drum inventory log and appropriate sample collection log.

7.8.6.2 After a group of drums have been sampled, the samples will be collected. The sampling trash, sample gloves, paper towels, etc., will be collected and placed into a drum marked "sampling waste" for disposal.

The sampling pipettes will also be collected and packaged in the sampling waste drum for disposal.

7.8.6.3 All openings shall be plugged except during sampling operation. The reason for this is to prevent rainwater from entering the drum before or after sampling has been performed. For drums which are in overpack containers, this is simply having the lid on the overpack container. For drums which are not in overpack containers, this can be accomplished by placing polyethylene sheeting over the top of the drum in a manner that will keep rainwater from entering the drum.

7.8.7 Drum Inventory Log

7.8.7.1 The field data gathered during the drum sampling activities will be recorded on a Drum Inventory Log sheet (See Figure 7.8-1). The following is a list of the information needed for the form.

7.8.7.1 Drum Number--Numbers only; at least 3 digits in length (001).

7.8.7.2 Project Number--Assigned by IT to each project.

7.8.7.3 Page of --If the drum log is accompanied by Material Safety Data Sheets (MSDS) or other information, then the total number of pages is required. Mostly, will be page 1 of 1.

7.8.7.4 Project Location--Name assigned by IT.

7.8.7.5 Project Contact--The IT employee responsible for over-seeing the sampling operation. This person should be the individual to whom questions are to be directed or verbal results given for review (i.e., project chemist, or site supervisor).

7.8.7.6 Phone--Site phone or number of the supporting IT office.

7.8.7.7 Logger--Name of individual responsible for filling in the sampling portion of the Drum Inventory Log.

7.8.7.8 Sampler--Name of individual(s) responsible for obtaining the sample.

7.8.7.9 Weather--Weather conditions during sampling (e.g., temperature and/or precipitation).

7.8.7.10 Date--Date when sample is collected.

7.8.7.11 Time--Time when sample is collected.

7.8.7.12 Drum Type--Place an "x" in the box or boxes which best describe the drum type and materials of construction.

7.8.7.13 Lid Type--An "x" should appear in the box that describes the type of closure on the container.

7.8.7.14 Drum Condition--Place an "x" in the box indicating the integrity of the drum. "Meets DOT specifications" means the drum can be shipped according to Department of Transportation (DOT) regulations.

7.8.7.15 Drum Size--Place an "x" in the box indicating the volume of drum when full. If the drum is overpacked, the inner drum volume should be indicated, not the size of the overpack.

7.8.7.16 Drum Contents--Place an "x" in the box indicating the volume of waste contained in the drum.

7.8.7.17 Overpacked--An "x" should appear in the "yes" box if the container was overpacked, along with an "x" in the box which states the type of overpack utilized.

7.8.7.18 Layers--This designates the layer as top, middle, or bottom for a multi-layered sample. If only one layer exists, complete only the line associated with the top layer, "T."

7.8.7.19 Physical State--Place an "x" in the box indicating the actual physical state of each layer.

7.8.7.20 Color--The standard color description for each layer of the sample should be written in. **The only acceptable color descriptions are as follows.**

blue (blu)	white (wht)	black (blk)
red (red)	cream (crm)	orange (org)
pink (pnk)	yellow (yel)	gray (gry)
colorless (cls)	purple (pup)	tan (tan)
green (grn)	brown (brn)	green-blue (gbl)

7.8.7.21 Clarity--An "x" should appear in the box indicating the clarity of each layer of the sample.

7.8.7.22 Layer Thickness--Record the thickness of each layer in inches, an estimate of how deep the layer is.

7.8.7.23 pH--Record pH measurement in standard units (SU); 0 to 14 or the designation "NA" if there was no measurement obtained.

7.8.7.24 PID--Record the results for vapor analysis by photoionization detector (PID) or the designation "NA" if there was no measurement obtained. The PID scale reads in ppm (0 to 2,000).

7.8.7.25 Dosimeter-The results of the field radiation survey is recorded in this space or the designation "NA" if there was no measurement obtained. The dosimeter's scale units are in millirems per hour (mr/hr or mrem/hr).

7.8.7.26 Other--This space is for additional analysis which may take place or the designation "NA" if there were no other measurements. The information should include the equipment used, the parameter being measured, and its concentration. Example: Drager tube - HCN - 5 ppm

7.8.7.27 DOT Haz--Hazard category from placards or stencils on drum. Example: Corrosive Liquid

7.8.7.28 UN/NA--Space for any UN or NA numbers which are stenciled or written on the drum. These numbers are always prefixed by either UN or NA.

7.8.7.29 MFG Name--Name, address, and telephone number of the company producing or distributing the chemical/product. If the space provided is inadequate, indicate that the information continues on the back of the log, and do so.

7.8.7.30 Chemical Name--Any chemical compound, key ingredient, trade name, and/or chemical name of the contents on the label or stenciled on the drum. Indicate whether the information was printed on a label or stenciled or handwritten on the drum. If the space provided is inadequate, indicate that the information continues on the back of the log, and do so.

7.8.7.31 Additional Information--This space is for additional information or comments for which no specific space is designated. It can include unusual comments or problems such as the contents are too hard to sample, drum color, or that colored crystals have formed on the drum. If the space provided is inadequate, indicate that the information continues on the back of the log.

7.8.8 Sample Preservation and Packing Procedures for Drummed Waste Samples

7.8.8.1 No preservatives shall be used.

7.8.8.2 Place sample in a zip lock plastic bag.

7.8.8.3 Sample may require special shipping requirements per DOT.

7.8.8.4 Samples that are required to be shipped in ice should be double-bagged to prevent water contamination from melting ice. Ice should be double-bagged to prevent leakage from shipping container.

7.8.8.5 Arrange for the appropriate transportation mode consistent with the type of hazardous waste involved. Depending on mode of transportation and type of material being transported, additional packaging requirements may apply (IATA, DOT, etc.).

7.8.8.6 In general, follow the procedures given in the site-specific field sampling plan and in the Installation-Wide Work Plan (IT, 1998) and Installation-Wide Sampling and Analysis Plan (IT, 2000).

7.8.9 Decontamination Procedures

7.8.9.1 All sampling equipment used in obtaining samples from containers will be either dedicated (disposable) or pre-cleaned and decontaminated by the following procedures:

7.8.9.1.1 Thoroughly scrub with a brush using a detergent (Alconox) and hot water solution to remove large particles.

7.8.9.1.2 Thoroughly rinse the detergent solution off the equipment with tap water.

7.8.9.1.3 Rinse the equipment with deionized water.

7.8.9.1.4 Solvent rinse the stainless steel equipment only with pesticide grade isopropanol.

7.8.9.1.5 Solvent rinse the glass equipment only with pesticide grade Hexane.

7.8.9.1.6 Air dry the equipment before use.

7.8.10 Resealing and Secondary Staging

7.8.10.1 All containers opened for sampling need to be resealed to prevent the escape of vapors and possible reactions from rainwater, air and so on. The resealing methods will depend on the opening methods used and include the following:

7.8.10.1.1 Replacing the lid and retaining ring.

7.8.10.1.2 Placing the drum in an overpack (larger drum) when it cannot be resealed by any other method.

7.8.10.1.3 Placing polyethylene sheeting over the drum in a manner that prevents rainwater from entering the drum.

7.8.10.2 It is important to note that these resealing methods are for the purpose of preventing leakage from the container while it is in storage on the site. If the container is to be moved off the site, DOT regulations regarding transportation and sealing of drums will apply.

7.8.10.3 Once the drum is sampled and resealed, it should be left where it cannot react with other containers on the site. For a small number of drums, the storage areas may be the staging and opening area. In any event, the sampled drums should be placed in an area away from other groups of containers on the site. The reason is that slowly progressing chemical reactions can start when a container is opened and the contents exposed to air or the disturbance caused by handling the drum. Such a reaction could take hours or even days to occur. Another reason for the segregation and identification of drums for recovery is for use as evidence.

7.8.11 Sample Control

7.8.11.1 The Project Chemist or his/her representative on-site is responsible for the identification, preservation, packaging, handling, shipping, and storage of samples obtained from the site. All samples must be readily identifiable and retain the in-situ characteristics to be determined through testing. All samples collected from containers to be analyzed for compatibilities will be validated through the preparation of a drum log. At the conclusion of the daily sampling operations for containerized waste, it is the responsibility of the Technical Services Representative to review each sample with its respective drum log to assure the documentation is complete and accurate. His signature verifying the sample has been checked must appear in the "Field Reviewer" space prior to sending samples to the laboratory. In addition, these samples will be validated through the following steps:

7.8.11.1.1 Sample Containers--Samples taken from containers to be analyzed for compatibilities will be placed into a clean 8-ounce glass bottle and secured with a Teflon-lined lid.

7.8.11.1.2 Sample Number--Each sample will be labeled and uniquely identified in accordance with the numbering system used for this job.

7.8.11.1.3 Sample Label--Each sample label will be legibly completed and affixed to the sample container. The label will include the name of the sampler, date and time of collection, place of collection, unique sample ID number, analysis required, preservatives added, and type of sample (grab or composite).

7.8.11.1.4 Field Log--All sample collection data and field observations for each sample will be recorded on a drum inventory log (see section 7.9.4.1).

7.8.11.1.5 Chain-of-Custody Procedures--All samples taken on the site will be verified through chain-of-custody procedures. The procedures followed will be in accordance with USACE Sampling Handling Protocols and USEPA procedures.

7.8.11.1.6 Sample Preservation--Samples taken from containers to be analyzed for compatibility will not be preserved.

7.8.11.1.7 Sample Shipment--Samples taken from containers to be analyzed for compatibilities will be packaged in their original shipping container or the sample bottles and transported to the laboratory.

7.9 Characterization and Test Blending

7.9.1 A waste blending test is used to determine if the drums included in a wastestream are truly compatible. Whether the wastes are to be blended on site or to be sent in drums to a disposal facility, a waste blending test must be performed for waste profile purposes. Section 8.0 of the Compatibility Manual (Attachment 1) outlines waste blending procedures used by the on-

site Chemist. However, situations arise when the Sample Technologist is asked to determine which compatibility groups can be blended. Refer to Section 8.0, Waste Blending, in the Compatibility Manual (Attachment 1) prior to test blending any materials. A waste Blending Test chart is found in the Compatibility Manual.

7.9.2 When using the Waste Blending Test Chart, the first step is to locate the compatibility groups (which are to be test blended) on the chart. The next step is to move to the group that appears first on the chart and follow the row number down until the other compatibility group is reached. For example the supervisor of project (x) is planning to mix acid liquids with the water reactives on site. The supervisor wants to know if this will be a safe combination. The first step is to locate acids and water reactives on the chart. Once the two groups have been located, the next step is to determine which group is listed first on the chart. The acids group is listed first. The next step is to follow column one down to the water reactive group. The chart lists the combination to be (I,V,E). The final step is to determine what the letter combination means (this can be found on the upper right portion of the chart). The I is for Incompatible, the V is for Violent Reaction, and the E is for Explosive Mixture. Therefore, it would **not** be a good idea to blend these compatibility categories.

7.9.3 Shipment of Blended Waste

7.9.3.1 Samples of the blended waste to be sent off-site for laboratory analysis for disposal parameters will be shipped by the following procedures and by the procedures listed in the site-specific field sampling plan, the Installation-Wide Work Plan (IT, 1998), and Installation-Wide Sampling and Analysis Plan (IT, 2000).

7.9.3.1.1 The lids of the sample jars will be sealed with tape.

7.9.3.1.2 The sample container will be placed inside two 4-mil plastic, protective bags.

7.9.3.1.3 The sealed sample will be place in a metal paint can.

7.9.3.1.4 The samples will be placed into a cooler and packed with blue ice to maintain their temperature at 4 degrees Centigrade.

7.9.3.1.5 Bubble pack or other insulating packing material will be placed into empty spaces in the cooler.

7.9.3.1.6 The cooler will be sealed, addressed, identified, and placarded according to the nature of the hazards associated with the materials being shipped.

8.0 EQUIPMENT

8.1 The equipment listed below will normally be required to accomplish drum sampling on a project site. Additional equipment or more specific equipment requirements may be found in the Installation-Wide Sampling and Analysis Plan (IT, 2000).

* Spill control kit.
* Remote controlled drum opening equipment - pneumatic, hydraulic or other.
* LEL/O_2 meter (MSA Model 260/360).
* HNU portable organic vapor analyzer (Model HW-101).
* Fire extinguisher, Class A, B and C size as per H&S Plan requirements.
* Radiation survey meter, internal GM detectors (Ludlum Model 5, P/N 48-1607).
* Personal protective equipment. This may include: Robar or Tingley boots, Tyvek and/or Saran protective suit with hood, acid jacket and pants, vinyl booties, vinyl sample gloves, nitrile outer gloves, hard hat with splash shield and SCBA or airline units.
* Rolls of plastic sheeting (Visqueen).
* Sampling equipment.
* Equipment and supplies needed for drum sampling (per 100 drums).

- 120 drum log sheets (IT Supplied)
- 120 8oz jars with Teflon lined lids (Qoorpak Brand)
- 200 tongue depressors (VWR P/N 62505-006)
- 120 11mm dip tubs
- 400 pair sample gloves
- 5 mean streaks
- 4 rolls of paper towels (Local Purchase)
- 2 30 gal. polyethylene trash bags (Local Purchase)
- 12 chain-of-custody forms (IT Supplied)
- 1 Liter of isopropanol (Pesticide Grade)(VWR P/N JT9334-3)
- 1 Liter of hexane (Pesticide Grade)(VWR P/N JT9126-3)

* Equipment and supplies generally needed per drum job

- 1 12-column book (Local Purchase or IT Supplied)
- 2 IT record books (IT Supplied)
- 1 knife, beryllium copper (McMaster-Carr P/N 3925A1)
- 1 bung wrench, Ampco metal (McMaster-Carr P/N 6496A1)
- 1 screwdriver, beryllium copper (McMaster-Carr P/N 6525A3)
- 1 scraper, beryllium copper (McMaster-Carr P/N 6473A1)
- 1 hammer, claw, BeCu alloy (McMaster-Carr P/N 6484A2)
- 1 chisel, Ampco metal, 1" wide (McMaster-Carr P/N 6458A94)
- 2 pairs cut-proof glove liners (Lab Safety P/N WA-15128)
- 2 15/16" sockets, BeCu alloy (McMaster-Carr P/N 6503A33)
- 2 1/2" drive ratchets, BeCu alloy (McMaster-Carr P/N 6503A3)
- 1 11/4" X 18"L wood boring bit (McMaster-Carr P/N 2878A25)
- 1 1/2" air powered drill, low RPM (Grainger P/N 4Z542)
- 1 tool box, polyethylene with lock for above (Local Purchase)
- 2 wash bottles, isopropanol (Lab Safety P/N WA-13831)
- 2 wash bottles, hexane (Lab Safety P/N WA-23158)
- 2 wash bottles, acetone (Lab Safety P/N WA-13828)
- 1 H_2S monitox with gas generator (IT Supplied)
- 1 HCN monitox with gas generator (IT Supplied)

* Source of pressurized air (100 psi and 8 CFM) and air hoses for air drill and remote pneumatic drum punch.

8.2 Deviations from the above list and substitutions for equipment listed above need to be approved by the Project Chemist or the Manager, Field Sampling Services.

9.0 ATTACHMENTS

Attachment 1 – Section 8.0 of the Compatibility Manual.

IT CORPORATION
A Member of The IT Group

DRUM INVENTORY LOG

DRUM _____
PROJECT NO. _____
PAGE _____ OF _____

)JECT LOCATION _____ LOGGER _____ DATE _____
PROJECT CONTACT _____ SAMPLER _____ TIME _____
PHONE _____ WEATHER _____

DRUM TYPE: FIBER ☐ POLY-LINED ☐ STEEL ☐ POLY ☐ STAINLESS STEEL ☐ OTHER ☐
LID TYPE: RINGTOP ☐ CLOSED TOP ☐
DRUM CONDITION: MEET DOT SPEC. ☐ GOOD ☐ FAIR ☐ POOR ☐
DRUM SIZE: 110 ☐ 85 ☐ 55 ☐ 42 ☐ 30 ☐ 16 ☐ 10 ☐ 5 ☐ OTHER ____
DRUM CONTENTS: VOLUME: FULL ☐ 3/4 ☐ 1/2 ☐ 1/4 ☐ <1/4 ☐ MT ☐
OVERPACKED: NO ☐ YES ☐ Overpack Type: FIBER ☐ STEEL ☐ POLY ☐

	PHYS. STATE				COLOR	CLARITY			LAYER THICKNESS
LAYERS	LIQUID	SOLID	GEL	SLUDGE	USE STD COLORS	CLEAR	CLOUDY	OPAQUE	INCHES
T									
M									
B									

FIELD ANALYSIS

pH _____ SU PID _____ ppm
DOSIMETER _____
OTHER _____

DRUM LABELS/MARKINGS

DOT HAZ _____ UN/NA _____

MFG NAME _____

CHEMICAL NAME _____

`DITIONAL INFORMATION _____

LABORATORY COMPATIBILITY DATA

☐ MARK IF PHYSICAL STATE AND COLOR MATCHES THE ABOVE INFORMATION. IF NOT, STOP ANALYSIS AND NOTIFY PROJECT CONTACT. FURTHER WORK WILL NOT BE PAID FOR.

RADIATION: POS ☐ NEG ☐ ___MREM/HR

COMPATIBILITY CAT: _____
ANALYSTS: _____
DATE PERFORMED: _____

	PHYS. STATE				COLOR	CLARITY			WATER SOL	REACT	pH	HEX SOL	PER	OXID	CN	SL	BIEL-STEIN	FLASH POINT	PCBs (25 PPM)	PCB TEST COMP
Layers	Liquid	Solid	Gel	Sludge	Use Std Colors	Clear	Cloudy	Opaque	Solubility SPSI Density H Or L	A=Air W=Water	Std. Unit	S Or I	+ Or -	+ Or -	+ Or -	+ OR -	+ OR -	<50°C + OR -	+ OR -	NUMBER
T																				
M																				
S																				

COMMENTS: _____

PCB CONC. _____ PPM FLASH POINT _____ °C COMPATABILITY COMP. BULK # _____
DATA REVIEWER: _____ DATA REVIEW DATE: _____
FIELD REVIEWER: _____ FIELD REVIEW DATE: _____

TRANSFER NUMBER	TRANSFERS RELINQUISHED BY	TRANSFERS ACCEPTED BY	DATE	TIME
1				
2				
3				

Figure 7.8-1